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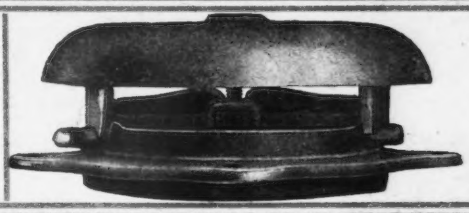

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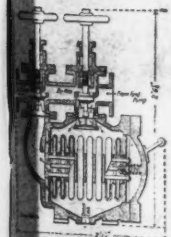

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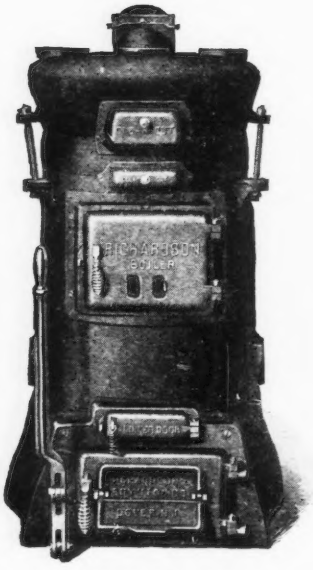

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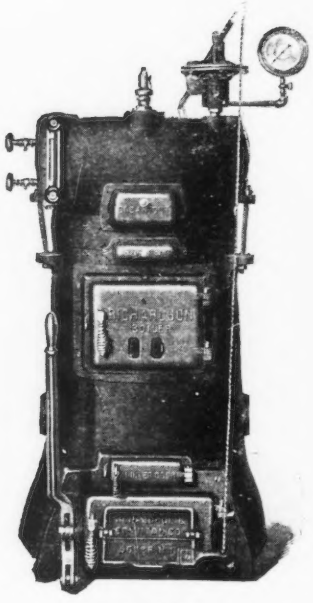

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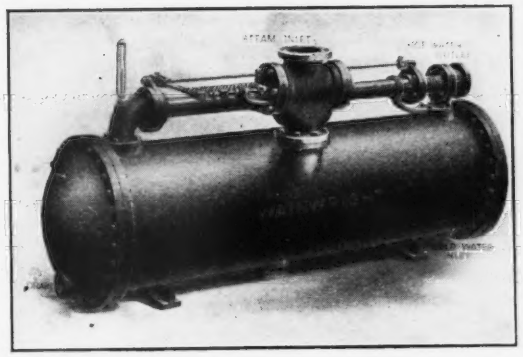

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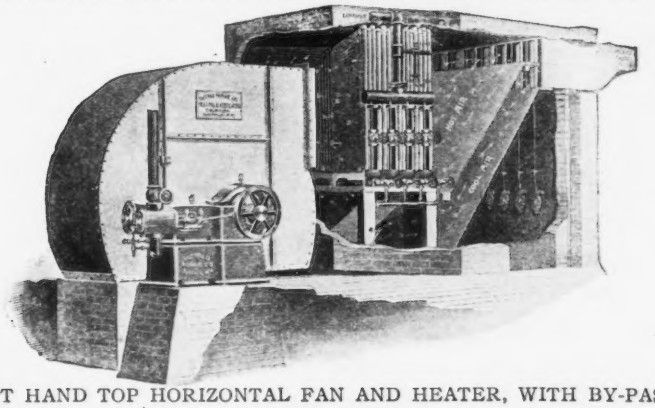

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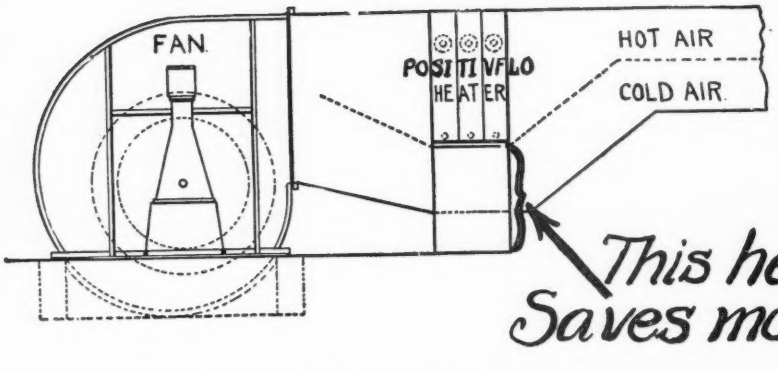

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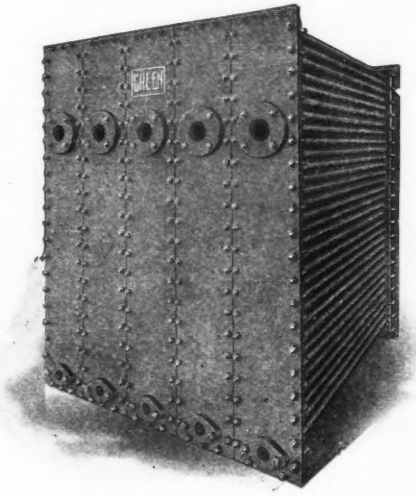

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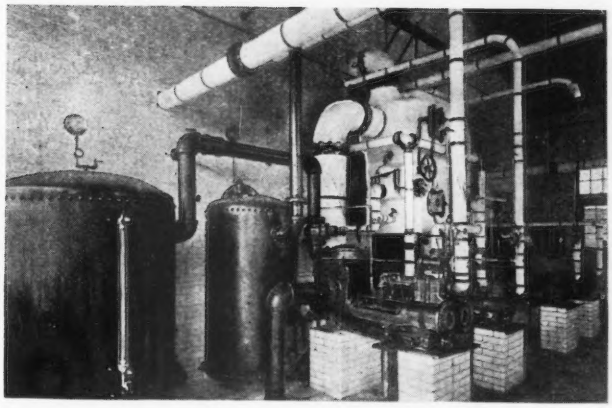

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The Heating and Ventilating Magazine

VOL. VII No. 12

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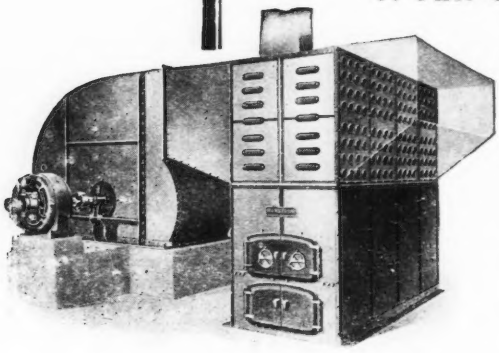

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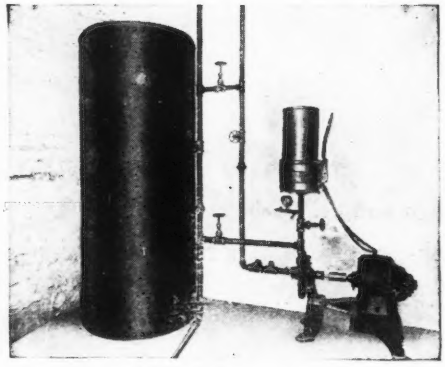

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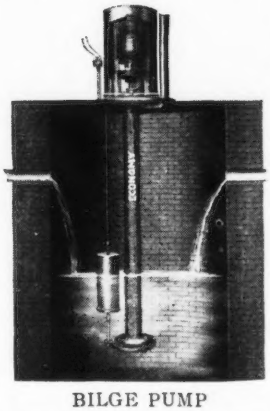

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THE HEATING AND VENTILATING MAGAZINE

1123 BROADWAY NEW YORK DECEMBER, 1910

Present Status of Ozone, With Reference to Air Purification

BY RALPH D. SMALL

DELIVERED BEFORE THE 18TH GENERAL MEETING OF THE AMERICAN ELECTROCHEMICAL SOCIETY, OCTOBER 14, 1910, AT CHICAGO, ILLINOIS

The development of ozone for industrial uses, water purification and ventilation, has progressed rapidly since 1903, which seems to be the medial line between inaccuracy and accuracy so far as determination, concentrations, economical operation, properties and uses of ozone is concerned. In 1890, for instance, the French Academy appointed a commission to report on the status of ozone in Europe. After a lengthy investigation their report submitted proved absolutely inconclusive. The members were almost divided as to what they recognized had been scientifically proven.

From 1895 to the present date the whole subject has been largely taken out of the laboratory and put on a commercial plane, and this has been chiefly dependent upon the progress and developments that have taken place in the electrical industry.

Ozone, as every chemist and physicist is aware, is merely an allotropic modification of oxygen, and its symbol in chemistry is O_3, You frequently see the formula $3O_2$ equals $2O_3$. This is an imperfect presentation of the relationship of oxygen and ozone. When three molecules of two atoms each of oxygen are split up by an electrical stress the free atoms recombine into two molecures of three atoms each, but the energy required to bring about the chemical change is the most significant part of the equation, so that modern chemistry state it thus: $3O_2 + \text{Energy} = 2O_3$.

As this paper is to be largely devoted to the uses of ozonized air as an adjunct or supplement to ventilation, very little reference will be made to the largest commercial use to which ozone has at present been put, namely, that of water purification, except by way of general information to state that water purification by ozone has in many places of Europe largely supplanted every other method of filtration and sterilization that is known. In the United States, owing probably to imperfectly developed methods, a like success cannot be claimed.

To-day there are over 150 patents in the United States Patent Office, and this department is rapidly becoming one of the "busy" departments, thus indicating the amount of interest that is now being taken in the latest development

of the electrical field, or, more properly—the electro-chemical field.

HOW OZONE IS PRODUCED

There are various ways of producing ozone, such as the oxidation of phosphorous, or the action of ultra-violet rays upon air, these rays being produced by a mercury vapor lamp in a quartz receptacle, or by heat, according to Nernst and Clement, by which they produce three grams per kilowatt hour. It should be stated here that concentration is the percentage of ozone usually measured in grams contained in a cubic meter (about 35 cu. ft.) of air.

All these processes, however, are not economical for commercial purposes. Ozone is produced in nature by evaporating water, when acted upon by the ultra-violet rays of either sunlight or electrical discharge. It is also produced from green plant life in what is known as the process of photo synthesis. In this process carbon dioxide is absorbed and unites with water to form carbohydrates. In this chemical reaction the atoms of oxygen are liberated and appear in a nascent state.

This affords a logical origin for the presence of ozone in the vicinity of forests or where much plant life is found. Its presence in mountainous regions and higher air strata is largely accounted for; first, by the lack of organic impurities to use it up, and, second, because the sun's ultra-violet rays having less atmosphere to pass through, are more slowly absorbed. This is investigated quite extensively by Ladenburg and Lehmann, as was noticed in the *Scientific American* of August 6, and their works are now the basis of a series of investigations on the part of the United States Weather Bureau. The spectroscope is used to determine the presence of ozone in such investigations.

It is generally conceded now since the research of Henriet and Bouysey, and also Steinmetz, that ozone is created by the action of ultra-violet days upon oxygen, that it is an endo-thermic process; heat is absorbed. In nature this usually takes place and is more observable when there is much electricity in the air or when water evaporates quickly as on the beach of the seashore where it is in a finely divided state and on account of which these rays have a better opportunity for their peculiar action.

ITS PRODUCTION FOR AIR CONDITIONING PURPOSES

For air conditioning purposes ozone is now being made with generators, which first change the direct current to an alternating current, preferably with cycles not less than 60, and then step up the voltage to all the way from 5,000 to 30,000, although it is now thought that to obtain the best economies a voltage under 8,000 is poor practice. The discharge is made by electrodes on either side of a dielectric, such as glass, micanite, mica, or some high insulating material, there being an air gap between the dielectric and the electrodes. The electric glow, which has no sparks such as is exhibited in the voltaic arc and which is comparatively heatless, is a brush discharge, purple in color, and fairly quiet in its action.

Various types of condensers and electrodes have been used from 1859 down to date. The consensus of modern opinion is that point electrodes, such as employed by Andreoli and others, have disadvantages, first, because they quickly lose their pointed character and round off, or, second, because a minute particle of dust can do a great amount of destructive work on a small point, in generating heat and interrupting the flow of electricity. Third, because the necessary cleaning of an infinitely large number of points require too much attention.

Leon Gerard, one of the leading electrical engineers of Belgium, states: "The aigrette or point elec-

trode apparatus has only 55% efficiency of those where the glow discharge is used." Other types of electrodes are either plates or cylinders on either side of a dielectric material, and these appear in various forms—flat, serrated, gridded or perforated.

Another tvpe is the covered electrodes, with no metal exposed, which is very commendable. A fourth is the use of a rotating or fan electrode, such as is shown in the Vohr type, which has the advantage of quickly forcing the air through the generating field and ozonizing it at the same time, thus giving a high purity of product. It is generally regarded as axiomatic that the briefer the period of ozonization the purer the resultant gas, purity meaning practically an absence of oxides of nitrogen, which are principally produced by heat, sparking, or the presence of dirt.

The amount of nitrous oxide generated by any properly made type of air ozonizer, however, is so infinitely small that it can be totally disregarded. This statement, however, does not apply to all ozonizers, as will be later explained. It may be stated that the more modern machines consume in operation 40 to 250 watts per hour.

EXACT CONSTITUENTS OF NORMAL AIR

Normal air has as its constituents, according to recent tables, giving volumes per 1,000 and not using the decimals beyond the fourth place:

Nitrogen	769
Oxygen	206
Aqueous Vapor	14
Argon	9
Carbon Dioxide	0.33
Hydrogen	0.19
Ammonia	0.008
Ozone	0.0015
Nitric Acid	0.0005

This is for normal air. It does not apply to air where all the ozone has been used up in oxidizing such various substances as the exhalations and emanations from millions of human beings, horses, automobiles, smoke from factories, trains, boats, gases and dust from manufacturing processes, volatile substances from rendering plants, packing houses and decomposing garbage and refuse in the street.

Authorities differ as to the amount of ozone in the air. It has been given all the way from one part in one million by volume up to one part in twenty millions. Perhaps a figure from one in 1,000,000 to one in 5,000,000 would represent what most have agreed upon as correct for those places where the presence of ozone is easily detected. So that the best constructed ozonizers of later years have been in alignment with or very little in excess of, the concentrations which nature provides in localities remarkable for their invigorating air.

German scientists have stated: "One-tenth of a milligram is the ideal concentration for continuous breathing." The limits as recommended by recent investigators is somewhere between one-tenth of a milligram up to two milligrams. If a density of much over a centigram is used, another factor must be relied upon to dilute the ozone to a point where it is agreeable to breathe, that is, the rest of the air in the room. This is unscientific, because you are dealing with a factor outside of your own control, and the air currents of any room differ from those of every other. The machine that delivers the ozone with a continuous uniform concentration and with a controllable yield is built along sane, scientific lines.

PROPERTIES OF OZONE

Ozone can be condensed to a liquid state of a bluish color with a specific gravity of 1.46. In this state it boils at about —120° Centigrade. Its density is 1 5/10 as compared with oxygen, and 1 66/100 as compared to ordinary atmosphere. It is slightly soluble in water, and more soluble in certain oils. It reverts to oxygen at 270° Centrigrade. It is unstable and rapidly disintegrates on standing. The

loosely attached third atom is constantly tending to fly off and combine with other atoms, as it has a remarkable affinity for all carbon or compounds of carbon which, so far as ventilation is concerned, will be hereafter referred to as organic matter.

Its value as an oxidizing agent is due to ease of application and because nothing but oxygen is used in reaction. In the lighter concentrations its odor faintly resembles that of freshly bleached linen and is crisp, refreshing and exhilarating. It can be detected by the nose when present in one part to ten millions of air. In the higher concentration its odor is pungent, heavy and disagreeable.

HEAT AND HUMIDITY RETARD PRODUCTION OF OZONE

Heat and humidity are unfavorable conditions for the generation of ozone. For this reason different methods have been employed to keep the electrodes cool. Steynis uses ammonia gas in pipes. Gerard uses oil. Others employ water jackets. The preferable method for air purification is the rapid passage of air by suction pumps or fans.

Any type of ozonizer where no mechanical means are provided for forcing the air rapidly past the electrode surface is utterly unreliable. In the first place, the air will remain for too long a period in the heat zone and thus produce an unsafe amount of nitrous oxide. Furthermore, this type of generator is unscientific, as there are no means of obtaining either concentration of yield, since there is no regular air flow to measure by. You must guess at what is being made and how much of it.

The amount of ozone generated is in direct proportion to the wattage of discharge per unit of air ozonized. Some element of heat is present in the so-called "cold" discharge, and this tends to destroy a portion of the ozone generated and also destroys the theoretical accuracy of the above statement. Heat increases as the square of the current of discharge. It is therefore desirable to use a high voltage and low amperage, and it has been found that from 8,000 to 12,000 volts produce ozone with commendable economy.

Very high concentrations are needed for such purposes, as water purification, the bleaching of fabrics, the destroying of disease germs, treating of petroleum oils, cyaniding (where with ozone it is now possible to get 94% efficiency off the plates where in many instances only 60% was obtainable before), sterilizing infected rooms, ships, etc. For all of the above from one up to twelve grams is required. As high as thirty grams concentration has been obtained. High concentrations necessitate high wattage of electrical discharge per unit of air. Here the air passage must be slow, which, of course, results in low volume of ozonized air. The converse of course holds true that the more rapid the air flow the higher will be the volume of ozonized air but the lower the density of concentration.

For all these large concentrations it is better to dry the air by the use of quick lime or other means, but for ventilating purposes it is not necessary to resort to this in the more recent types of ozonizers. One of the objections to extraordinary humidity is that an infinitely small amount of peroxide of hydrogen is liable to be formed.

METHOD OF MEASURING OZONE

The determination of the quantity of ozone generated is frequently obtained by using iodide of potassium solution. The iodine is freed by ozone, is acidified, then titrated by sodium thio-sulphite and starch.

AIR PURIFICATION

Of all known subjects which are intimately connected with our health and working efficiency, the least understood, the least attended to, with the most widely varying opinions in regard to it, is the subject of air purification and the chemistry of the air we breathe. Twenty

years ago we would have complacently taken any kind of water from any spigot or hydrant without much thought. To-day you won't take that chance because you know it is a chance that may produce harm. We now have spring water in bottles in our offices, or we use boiled or filtered water at home. Twenty years ago we took any kind of food in tin cans that was handed to us at the corner grocery store, but to-day the laws of the United States protect us. Pure food laws have materially cut down the ptomaine poisoning, dysentery, and various complaints arising from diseased or adulterated food. At present, however, although we eat but three times a day and drink water seven or eight times, we are breathing continuously both night and day and are thoughtlessly taking into our system any kind of air that we happen to find.

CARBON DIOXIDE DANGER EXAGGERATED

What is the harmful part of bad air? The consensus of modern chemists, physicists and scientists on this subject is absolutely conclusive; it permits of no debate. Experiments have been tried, tests have been made and the old bugaboo—carbon dioxide—has been effectually exposed. Many persons used to entertain an idea which is rapidly becoming obsolete, that is, that the carbon dioxide in the air is the particular thing that creates the harm. Carbon dioxide is harmful only in that it reduces the oxygen supply by displacing it. As long as you can get the proper percentage of oxygen in the air that you breathe, the amount of carbon dioxide produced in any chemical laboratory can be present—according to the best scientists of the last ten years—to an amount of twenty times that which many engineers put as a figure destructive to life. Carbon dioxide is not poisonous, but when present in quantities in any air it is a danger sign that impurities exist in that air. But remember that it is a signboard and not the danger itself. It is the organic impurities exhaled at the same time as the carbon dioxide that are poisonous, so merely getting rid of carbon dioxide is a good deal like burning up the danger sign to get rid of the danger.

Ira Remsen, one of the leading chemists of the United States, president of the Johns Hopkins University of Baltimore, has done much to explode this carbon dioxide theory. He states: "Carbon dioxide is given off from the lungs just as it is from the fire. It is a waste product—it is not poisonous any more than water is. If, however, pure carbon dioxide is introduced into air it has been found that as much as 5% may be present without serious results to those who breathe it. (5% is 500 parts in 10,000, though 20 parts in 10,000 is claimed by some as a menace to life.) The ill effects of breathing the air of a badly ventilated room occupied by a number of human beings appear to be due for the most part to the presence of the small quantities of decomposing organic matters which are given off with the carbon dioxide and other gases. These act as poisons."

So that it would seem that while ventilation is necessary to bring in out-of-door air to replace the oxygen which our breathing uses up, out-door air alone is absolutely insufficient to purify the indoor air. It never did and never will destroy the impurities that constitute the danger element. Nature purifies her atmosphere with ozone. Man can purify it only with ozone.

OZONE AS A DEODORIZER

Nothing has been said about ozone as a deodorizer. Its properties are remarkable in this line, and with higher concentrations almost any odor known, excepting the extraordinary perfumery from the pole-cat, can be successfully combatted. In an office, factory or home the chief odors to be eliminated come from tobacco smoke, cooking, laundry, sick rooms or any overcrowded spaces.

Undoubtedly ozonized air acts as a preventative of conditions which bring about many of our colds, and it is on the preventative rather than on the curative side that it has a serious claim to your consideration. There is just as much and no more magic in ozone for continuous breathing purposes as there is in pure air. Pure air will help the body to cure itself, and that is all that ozonized air in a concentration proper for breathing will do. There are so-called "doctors' machines," from which the patient is supposed to inhale ozone passed through turpentine oils for a few minutes each day. Nothing will be said about such apparatus except that it stands to reason that you cannot be sent to the Adirondacks or Martha's Vineyard or the Rocky Mountains and breathe that air for half an hour and then be sent back home with any reasonable expectation that that half hour's breathing will materially change your state of health. Interrupted administration of ozone in high concentrations certainly cannot be seriously considered as beneficial as its continued use in more diluted and diffused form.

The use of ozone in the purification of air is undoubtedly one of the most valuable of the newer achievements of electro-chemistry. First, as a preventative of conditions which undermine health. Second, as a promoter of working efficiency, which involves the third—an increaser of business output, so that commercial and physical welfare are materially aided by a little boxed-up lightning placed in one's office, factory or home.

Ventilation Troubles in School Buildings

WITH SPECIAL REFERENCE TO THE CHICAGO SCHOOLS

By W. A. Evans, M.D.

Constructive criticism of the operation of carefully designed heating and ventilating systems is always valuable; and when made by one outside of the engineering profession, often contains suggestions that can be followed with profit. Dr. W. A. Evans, health commissioner of Chicago, has shown himself to be a keen observer of the results actually obtained in the ventilation of public schools and in an address delivered before the section of Preventive Medicine of the American Medical Association he not only presents his observations but offers some ideas for the improvement of heating and ventilating methods that cannot fail to challenge interest.

The Chicago schools, he states, are heated by dry hot air. In the higher grade installations the temperature is held at 72° F. The relative humidity is 30%. 1800 cu. ft. of air per pupil per hour is pumped into the room. In the older installations we frequently find the temperature well over 75° F. and occasionally over 80° F. It has been assumed that because 1800 cu. ft. per pupil per hour is pumped in, the ventilation is as it should be. The assumption is rarely justified.

Believing, as I do, that the removal of air should be as direct as possible, I believe in low ceilings. Between the ceiling and the heads of the occupants is a volume of warm, foul air, which is being chilled and dropping into the breathing zone all of the time. The less space you have, the less foul air there will be to drop back into the breathing zone. I therefore believe in an 8 or 9-ft. ceiling. You will get the operators to heat only a certain volume of air and they will heat the same volume whether the ceiling is 8 ft. or 12 ft. By taking off the extra 4 feet you increase the amount of air which will be furnished in the breathing zone and that is what counts.

It has been our observation that school air is too hot and too dry. The temperature has ranged from 70° to 80°; the relative humidity has

been 30% to 40%. The dust content has not been high. The odors are objectionable in certain schools in the poorer parts of the town and in many schools on rainy days.

The Chicago schools are heated and ventilated as one item. The system used is the Waters. The air is taken in about 30 ft. above the ground. It is not cleaned. It is heated to about 110° to 130°, according to the temperature of the outside air, the velocity and the direction of the wind, and the sunshine. It is discharged into the school room at a point above the head of the teacher, by a large opening. It is discharged under an average velocity of 370 ft. per minute. It is exhausted near the floor line and usually on the same wall as the inlet. 1800 cu. ft. per pupil per hour is pumped in.

The theory is that the air, being hot and going at a considerable velocity, will rise to the ceiling and flow across to the opposite wall, where it will fall from wall chill and then flow back along the floor to find its outlet. The system is plenum. Should the system work according to theory, the breathing zone of the children at the desks would be dead, and, therefore, polluted, air. As a matter of fact, there are many currents and the air begins dropping to the floor almost as soon as it issues. The children situated back in the room do not get a very good supply of air. Much of the air short-circuits from the inlet to the outlet after traveling a short distance in the room.

SUGGESTED REMEDIES

What is the remedy proposed?

1. Reduce the temperature of the rooms to a maximum of 68°. This temperature is more bracing. In such a temperature the exhaled air, being hot and moist, will rise right out of the breathing zone and be supplied by purer air.

2. Raise the relative humidity to 60% to 70%. No possible objection can be raised to this except that it costs money to evaporate water and the windows will frost when the outside temperature gets to 20° F. and below. The best way to humidify is to introduce a spray of steam into the column of incoming air, if the air is to be pumped in. If the relative humidity is raised to 60% the pupils will be comfortable with a temperature of 68° F. What is saved on coal, as between 72° and 68°, will more than compensate for the steam which is used to humidify.

Some of the frosting of the windows can be prevented by putting a radiator under each window. In certain rare instances a fan throwing enough air against the glass to keep it warm can be used to prevent frosting. But what harm does frosting do, anyway? Its harm is negligible as compared with the harm of overdry air. It keeps out but little light, and under certain conditions of sunlight will give a mellower, softer light than the unobstructed pane. If the air is brought into the room through the radiators, it can be humidified by pans of water or by some of the patent humidifiers.

OCCASIONAL OPENING OF WINDOWS NECESSARY

3. Blow out the air in the room at stated intervals. This is best done by raising the windows and allowing the air to blow briskly through. A change of the air four times an hour will be effected by currents which are so mild that they will not lift bacteria. In consequence the bacterial flora of the air neither decreases nor increases unless it is being modified by animal inhabitation. If, however, the wind blows briskly in and out through windows, the bacterial flora of the air will be reduced 99%. Practically, the way to effect this is to have the teacher throw up the window when the children go out at recess. When they return they are warm, they have just made heat by exercising. By the time their heat equilibrium has returned to normal the heat equilibrium of the room will have been re-established.

4. Decrease the dust content of the air of the school room by having

the students at the blackboards use an eraser which is very slightly damp. A piece of cheesecloth fastened over the eraser does well.

ROOMS SHOULD NOT BE HEATED AND VENTILATED BY THE SAME AIR

5. Introduce the air into the room so as to keep the expired air as much separated from the fresh air as possible. This means direct removal of the air from the breathing zone. This cannot be done if the room is heated and ventilated by the same air. Such air is introduced at 110° to 130° F. If it were introduced near the floor and the outlets were placed near the ceiling the hot air would rush straight from the inlet to the outlet and it would be very difficult to prevent great loss of heat. The only feasible thing to do when heating and ventilating are done with the same air is to put the hot air in high and take it out low. The more rational plan is to have the air enter directly from the outside through holes in the walls; these holes to be closed by adjustable diaphragms. The air should pass directly through radiators and be discharged into the room at such a temperature as to maintain a temperature of 65° to 68°; other radiation to be a hot-water or steam gravity system.

HUMIDIFYING DEVICES ON RADIATORS

The radiators should have water evaporating attachments. The air should be introduced in the room at several different points through ducts inside the room, with many openings in the ducts; the exits to be on the inner walls at, in, or near the ceiling; the gathering ducts to lead to the attic with the smallest possible number of turns or angles. In a windy, cold climate, *e. g.*, that of Chicago, the duct should lead to a central large exhaust fan in the attic. In a less cold climate—for example, Cincinnati or Louisville—the ducts can lead directly to the roof and open to the outside, surmounted with one of the perflation devices to accelerate suction and to prevent down draft. The philosophy of this suggestion is that when the weather is not extremely cold, and all bends and turns are eliminated from the exhaust ducts, the fans can be eliminated.

In a milder climate, such as that at Memphis, the ducts can be made to discharge from each room directly to the outside air, the outlet being at the ceiling line. In the far south, *e. g.*, New Orleans and Mobile, the windows can be used all winter long, both for inlets and outlets, with this single suggestion, that the radiators be so placed that they will come a foot or two higher than the bottom of the window. When in cold weather the window is raised 6 in. or a foot from the bottom, the cold air which enters through the opening will pass through the radiation.

REDUCED COST OF APPARATUS AMONG THE ADVANTAGES

The advantages of such a method over the present method are:

1. The cost of installation will be less than the cost of installation at present employed. The system of ducts is much simpler and the capacity of the fans will be much less.

2. The cost of maintenance will be much less.

(a) On still days the fans will not run at all.

(b) On windy days the fans need only be used to exhaust the air from the rooms on the leeward side. The rooms on the windward side will exhaust without any artificial aid.

(c) The volume of air needed per pupil per hour can be reduced from 2000 cu. ft. per pupil per hour to 1000 cu. ft. per pupil per hour, or even less where the foul air is removed without much admixture with the fresh. In the language of the British Departmental Committee on Ventilation of Factories and Workshops, 1907, "The quantity of air depends on the distribution; and in many cases a relatively small quantity well distributed is far more effective than a large quantity badly distributed."

Location of Direct Radiators

A NEW THEORY AS TO THE POINT OF THEIR GREATEST EFFECTIVENESS

The placing of direct radiators preferably in front of windows has been criticised in more than one quarter of late, one writer having characterized the practice as a confession of weakness in not being able to properly minimize the heat losses around windows.

An equally interesting aspect of the question was discussed by Mr. Frederick Nye before the Institution of Heating and Ventilating Engineers, and his views are presented herewith:

It may be reasonably assumed that there is a best position for a radiator to occupy in a room, and while the customer often decides where the radiator shall stand, we ought to consider that there is a best position from the heating engineer's point of view if he is at liberty to express his choice.

RADIATORS SHOULD BE AT RIGHT ANGLES TO WINDOWS

The position of radiators near a wall that has no windows, but at right angles, and near, the wall which has the windows in it, I believe, will give better results than any other.

My attention was first called to it in a house in which I lived some years ago, one room in which was warmed more effectively than the others without any apparent reason. I need scarcely say that I went to all reasonable trouble in trying to find a cause—after once realizing that there was something that wanted accounting for—taking into consideration position of room, temperature of water in the radiator (as compared with the others), the area of radiation, and all that could be thought of or done, and was finally forced to believe the position of the radiator had something to do with it.

It was the only radiator in the house so situated, but there was another one in the same room of a little larger size, and next on the circuit to the one in question (but on the wall opposite the windows), and this would not heat the room so well. I tried this several times, and the difference was so marked that it would, in words, appear like an exaggeration.

I feel convinced that the position indicated is a good one and better than others. Whether one may be discovered that is still better I do not know, and I must confess to feeling weak in offering any good reason for radiators so situated doing better service in keeping up the temperature of rooms than if fixed in different spots. Perhaps discussion may enlighten us, but I personally can only suggest that it is because the radiator deals effectively with the window end of the room, where the chief of, almost all, the heat loss occurs.

I have not noticed that the position of the fireplace (with its air-extracting chimney) affects the good results, but I have noticed, sufficiently to feel tolerably certain, that if one of the radiators be turned at right angles, so that it stands flat against the window wall, the good effect is reduced to a marked degree.

I do not favor putting radiators under windows, for, apart from curtains and drapery affecting results, the warmed air having contact with cold glass, must lessen the degree of warmth the radiator can afford to the room. It is recognized, of course, that the chief work a radiator has to do is to counteract the cooling influence of windows (always assuming that the air entering a room comes from a warmed entrance way). The windows do not constitute the whole work the radiator has to deal with, but, in a residence with a heating apparatus reasonably well arranged, the windows represent the greatest cooling influence in any kind of living room.

A radiator affords the desired sense of comfort by warming the air, the radiant heat from it being a negligible quantity as regards the question now under discussion. The warmth may be said to come from it in the form of a broad and thick ribbon, of flat stream of warmed air, ascending vertically from the radiator, this stream going toward the ceiling where it curves over and spreads, and becomes diffused in all directions more or less. In any case the warmed air goes up a few feet before it does anything toward warming the body of the room, and while this action may be modified in the case of radiators having ventilators behind them, it still remains the general rule.

If, therefore, this flat stream of warmed air first travels up against glass for about 5 ft., the glass being the great cooling factor in the room, we may suppose that the heat loss due to this cause is made the greatest it can be. I have not had opportunity to test and ascertain the actual difference (if any) in the resulting warmth in a room warmed by a radiator under a window, and one not under a window, but I have been gradually forced to consider that there is a difference sufficient to warrant my practice of allowing (in my own specifications) 15% more radiation than customary when radiators are to go under windows, even though they stand exposed and are not under window seats or window boards.

A High School Engineering Equipment, With Unique Features

THE NEW EAST SIDE COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL, NEWARK, N. J.

The mechanical equipment described herewith is the most complete of its character which we have had the opportunity of bringing to the attention of our readers for some time. It was designed by George W. Knight, supervising engineer to the Board of Education of Newark, N. J. Mr. Knight is assisted in this work by Perry West.

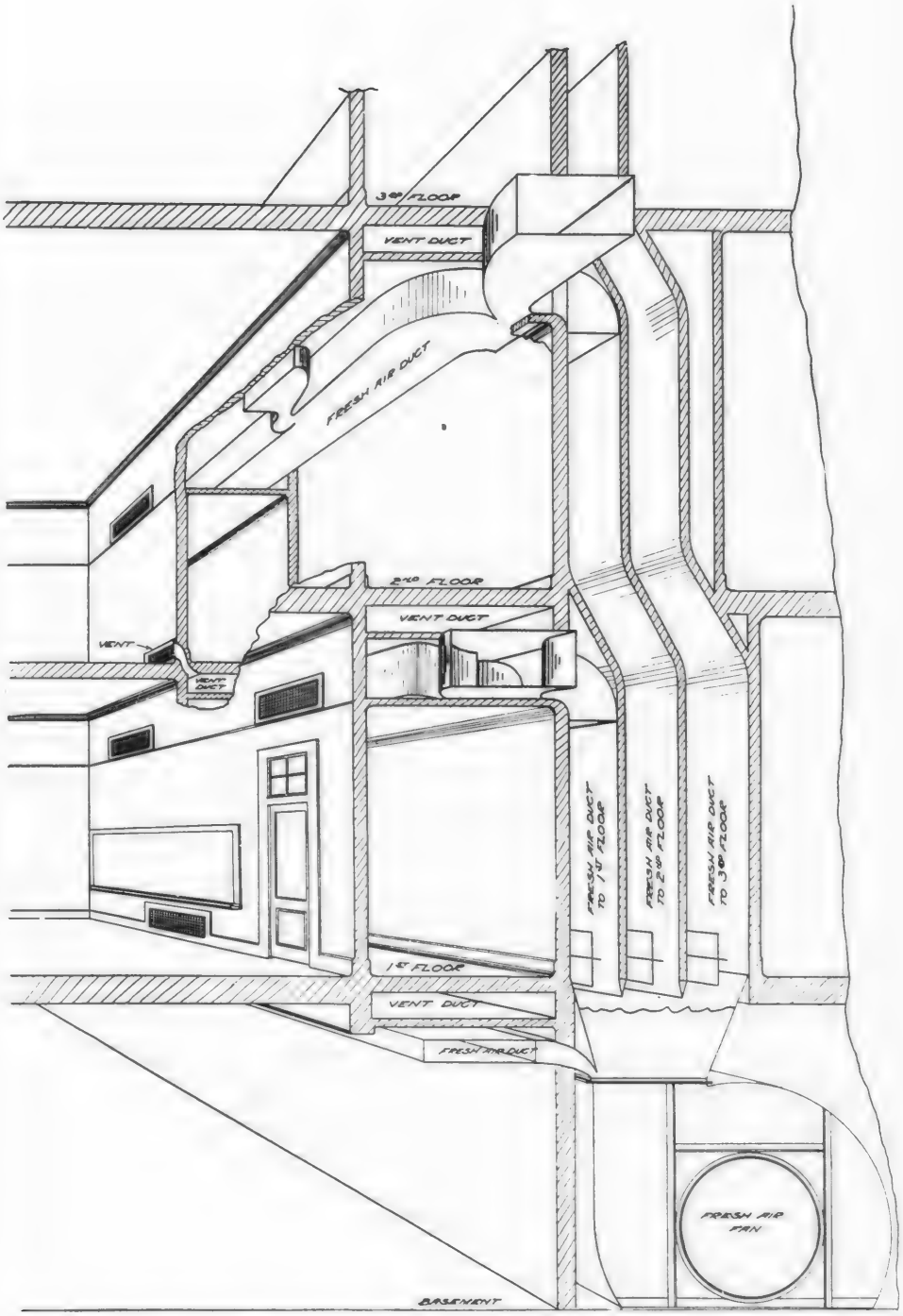
In order to present more graphically the special features of this installation, the illustrations include plans of the system as originally designed and as finally installed.

The new East Side Commercial and Manual Training High School in Newark, N. J., is one of the most modern and best-equipped buildings of its kind in the country. It contains about fifteen general class rooms, a forge shop, a large machine shop, a sheet metal shop, a mill and stock room, wood-working shops, chemical and physical laboratories and many other rooms devoted to special purposes. In addition there is a large assembly hall, a large and well-equipped gymnasium, with locker rooms, etc. The building is intended to accommodate about 1,200 pupils.

The following figures give some idea of the size of the mechanical plant and the requirements it is designed to meet, and the general description to follow will be interesting from the standpoint of the many unique features and the rather novel but highly efficient methods employed in many of its parts.

About 350 tons of warmed and purified are required per hour for ventilation, 1,000 incandescent lamps are used for artificial illumination, 150 H. P. for driving the shops and fans, 350 H. P. boilers for heating and power, 1,000 gals. of hot water per hour for showers and house service; all of which are provided for within the building, by its own plant.

This equipment consists of water tube boilers, an electric generating plant for light and power, fresh air fans and heaters, exhaust fans, a vacuum heating system utilizing exhaust



TYPICAL ARRANGEMENT OF FRESH AIR SUPPLY SYSTEMS, EAST SIDE COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL, NEWARK, N. J.

steam, a vacuum cleaning system, telephones, electric clocks, bells and the various distribution and transmissions, duct systems, etc.

The entire equipment displays a wide departure from the well-known and stereotyped systems for school work and other buildings of this character. The entire heating, electric lighting, and sanitation seems to have been accomplished in the most efficient manner, without the blocking of valuable head room, the cutting off of window light or the breaking up of rooms and other spaces with ducts and other obstructions, which objectionable features are too often considered inevitable with plants of this character.

THE BOILER ROOM

The boiler equipment consists of four 85 H. P. water tube boilers, designed for 150 lbs. working pressure and constructed especially strong to provide against accident. By the division of the boiler plant into small units, facilities are secured for laying off boilers which are not needed, or which may require cleaning or repairs, with the result that the operation can always be carried upon a full load and most efficient basis, and with all units in first-class working order.

Each boiler is equipped with a full set of shaking and dumping grates, having an area of 30 sq. ft. per boiler.

The ratio of heating to grate surface thus obtained is about 28 to 1, which, it will be noted, is lower than the general practice, but quite in keeping with the best results as shown by recent departures in this direction.

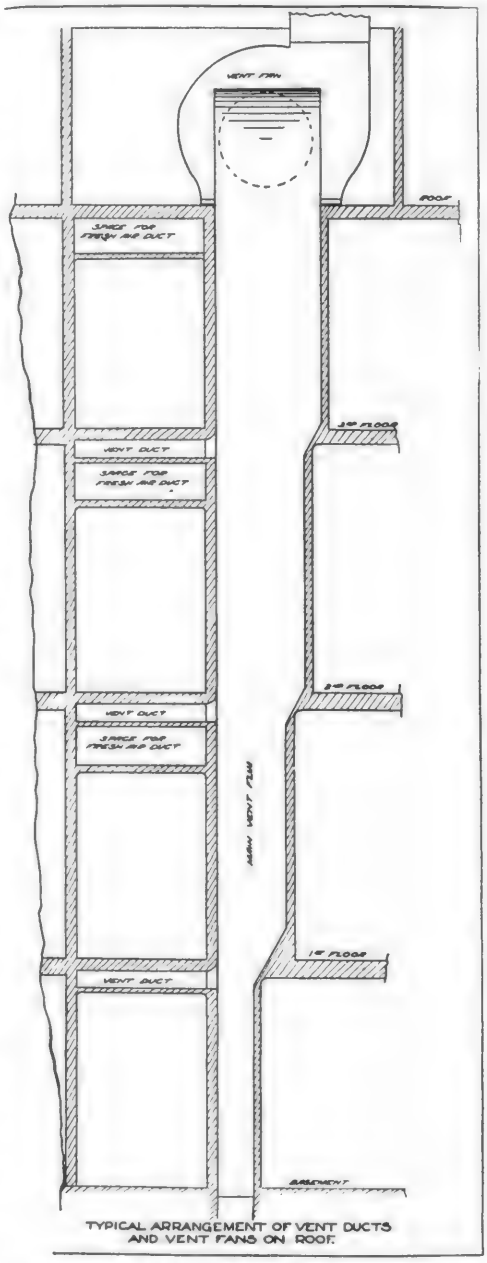
The draft is produced by a brick chimney about 100 ft. high, connected with the boilers by a sheet iron breeching.

Each individual smoke up-take is provided with a hand damper operated from the floor and in the breeching there is installed a main damper, automatically controlled by a damper regulator actuated by the steam pressure in the main headers.

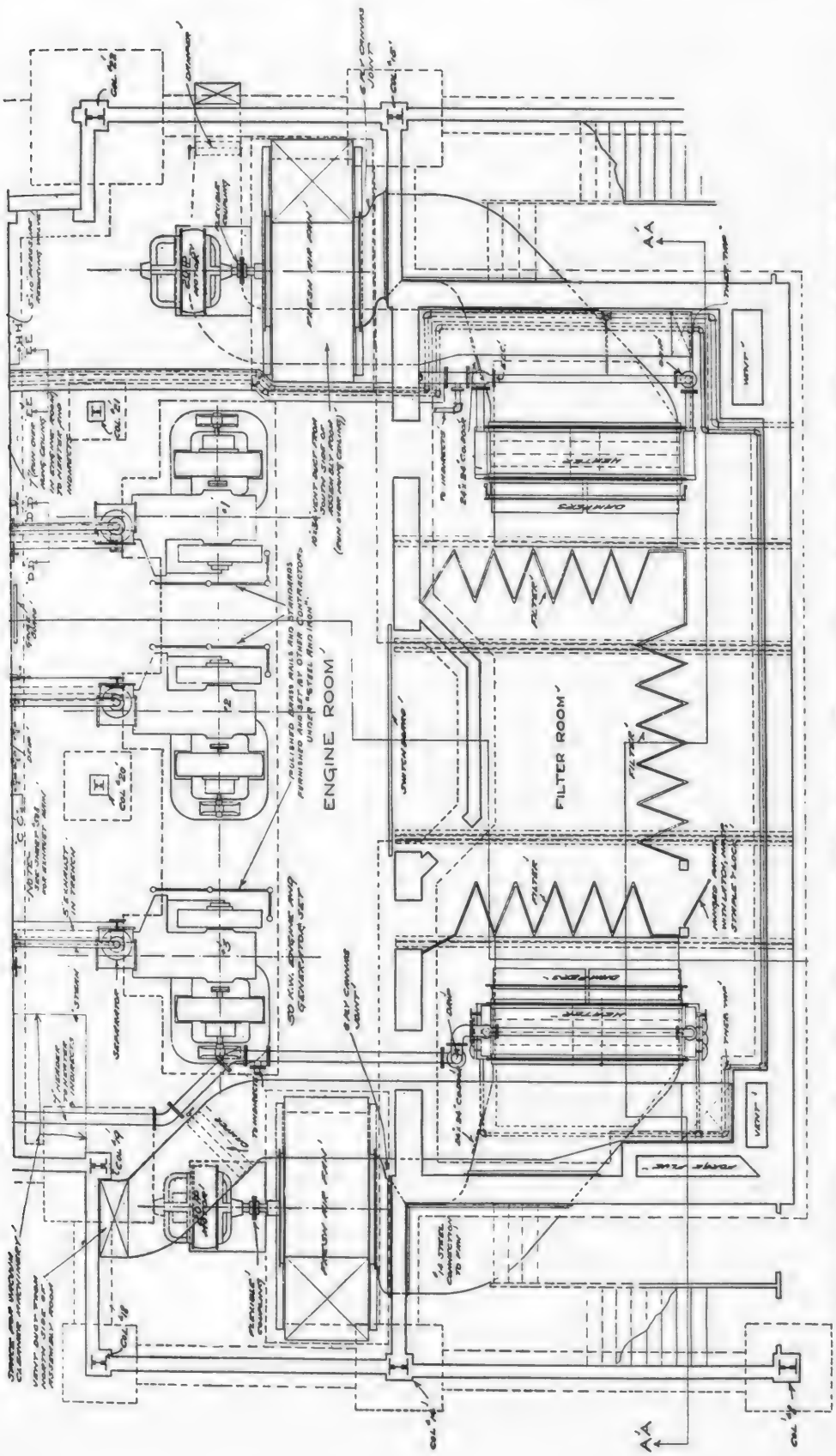
Each boiler is provided with two safety valves, high and low water alarm columns and other safeguards such as non-return stop valves, etc.

In order to eliminate the possibility of undue excitement being caused by the discharge of safety valves, the outlets of same are piped, through a main header, to the free exhaust riser leading out above the roof of the building.

This safety valve discharge piping

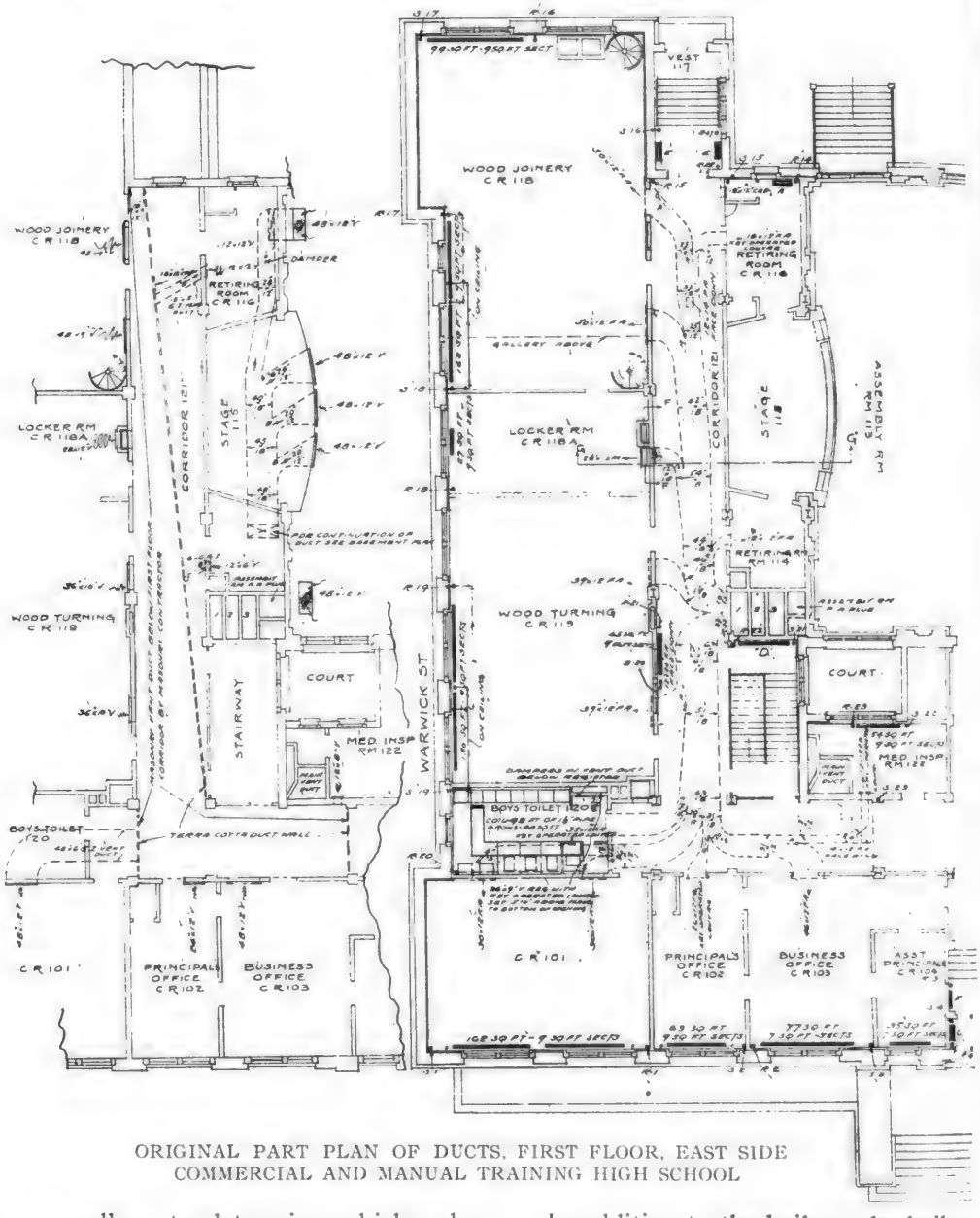


TYPICAL ARRANGEMENT OF VENT DUCTS AND VENT FANS ON ROOF, EAST SIDE COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL, NEWARK, N. J.



PART PLAN OF BASEMENT, EAST SIDE COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL, SHOWING ENGINE AND FAN ROOMS.

is provided with free drainage facilities and each safety valve has a tell-tale pipe, so as to obviate the possibility of the piping becoming clogged, ample for carrying the plant over any ordinary shortage in the coal supply. Ashes are removed by means of an ash lift to the yard above.

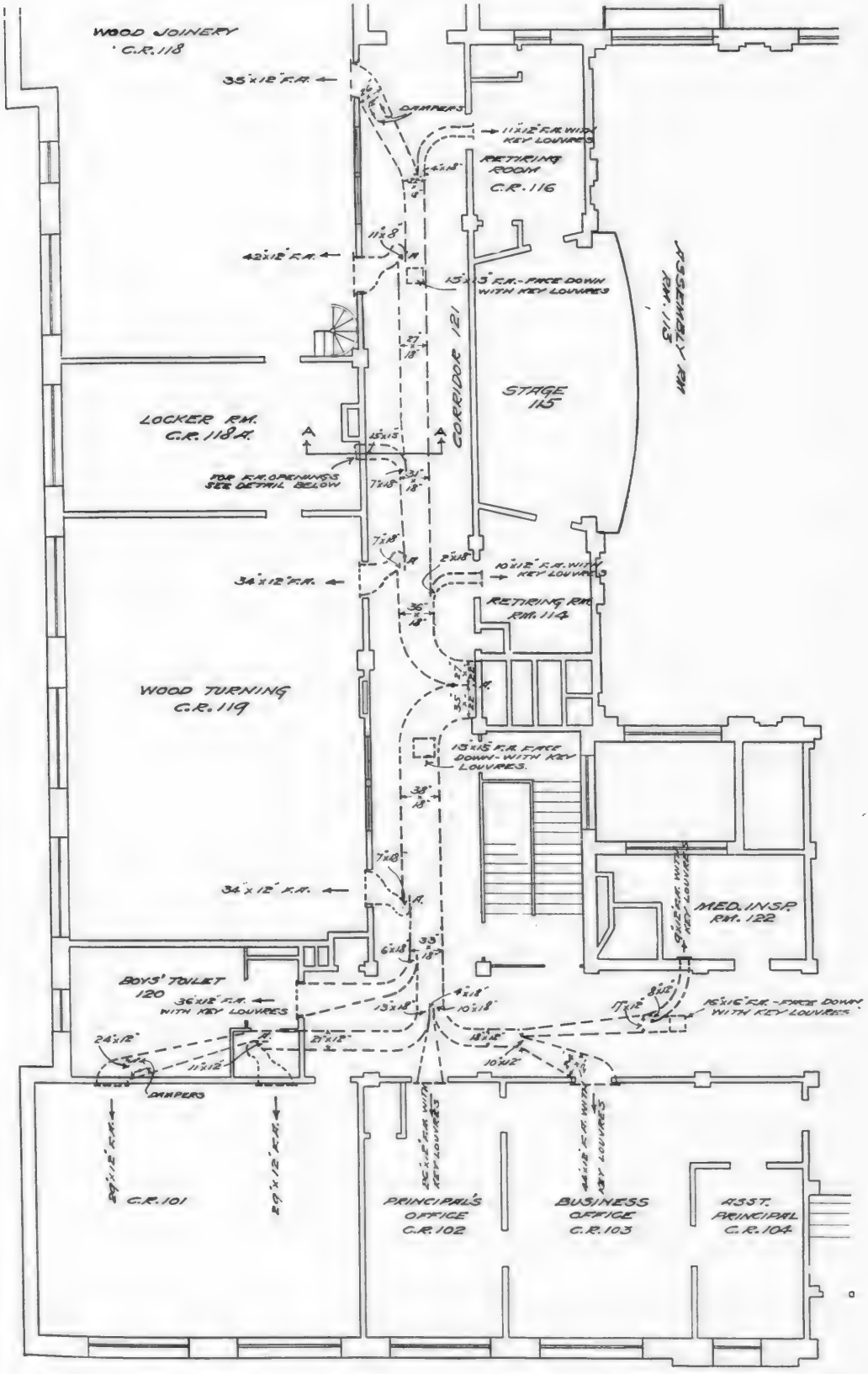


ORIGINAL PART PLAN OF DUCTS, FIRST FLOOR, EAST SIDE
COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL

as well as to determine which valve is discharging.

The coal storage is directly in front of the line of boilers, and the coal runs by gravity to the boiler room floor, It is prevented from obstructing the firing aisle by means of removable wood bulkheads. From one to two-months' storage is provided, which is

In addition to the boilers, the boiler room contains duplicate feed water pumps, duplicate vacuum heating pumps, a service water heater, oil extractor, feed water heater, etc. The blow-off tank is located in a steel-covered pit, below the floor, and located in the same pit is a vertical shaft, electrically-driven centrifugal



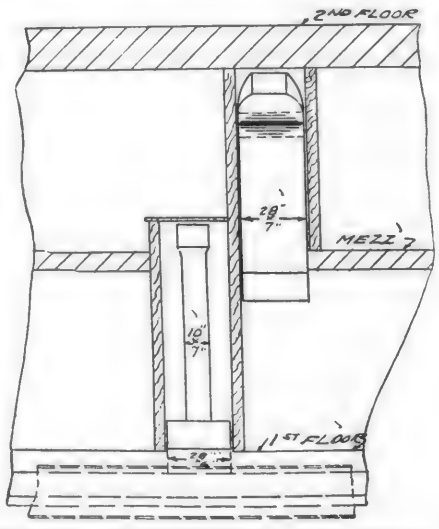
REVISED PART PLAN OF DUCTS AND OPENINGS, FIRST FLOOR, EAST SIDE, COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL

sump pump for removing the discharge from the blow-off tank and other accumulations of water from drips and drains, all of which are piped to this sump pit.

ENGINE ROOM

The engine room equipment embodies three direct-connected engine-driven generators of 50 K. W. capacity each, two direct-connected motor-driven fresh-air fans, an electrically-driven vacuum cleaner plant, temperature control pumps, the main switchboard, gauge boards, etc. In the division of the generating plant into three equal sized units, a perfect interchangeability is made possible, as well as the proper division and handling of the three almost equal loads, *i. e.*, fan power, shop power and lighting. In case one or more of these loads is off a corresponding unit or units may be shut down, or if a unit is laid off for cleaning or repairs, either of the other two units may take its place, all of which affords a very flexible system.

The main fresh air supply fans being of the direct-connected type and discharging directly up through the main supply ducts, without unnecessary duct work or belts, form compact and not unsightly or objectionable machines for the otherwise orderly engine room, and by consolidating all of the vital machinery in one room a very compact and easily-operated plant, as a whole, is secured.

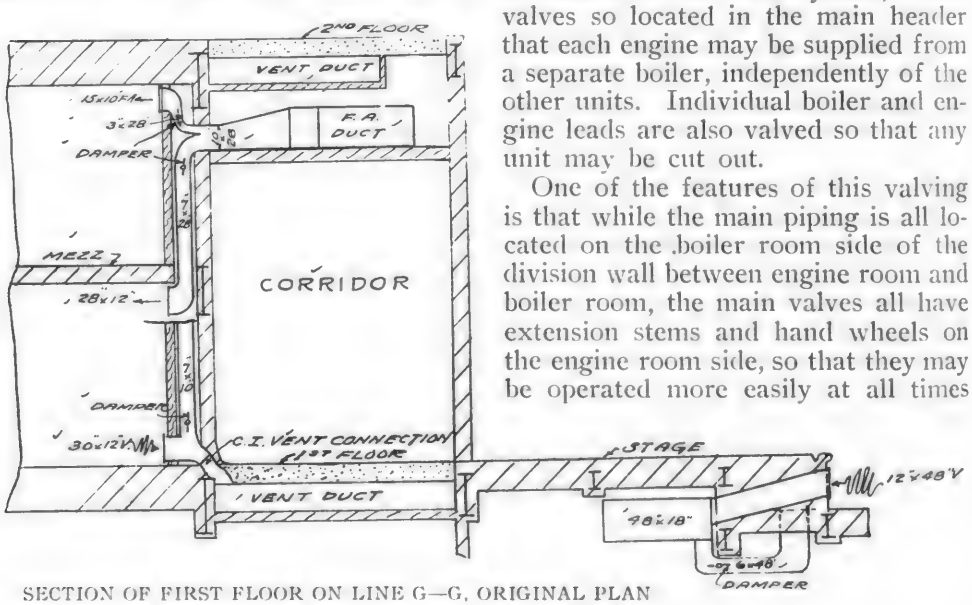


SECTION OF FIRST FLOOR ON LINE F—F, ORIGINAL PLAN

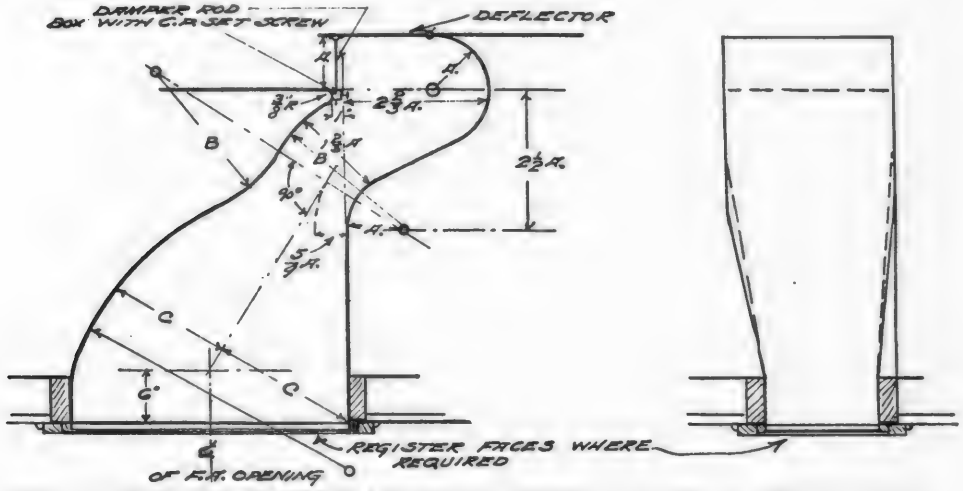
The engine boiler and engine plant is situated directly below the assembly room.

To prevent the transmission of sound and vibration to this room, a false ceiling is provided over the engine room, with an air space between the ceiling and the floor above. The engines are also set on foundations having sand cushions on bottoms and sides. The high pressure piping between the engines and boilers is arranged on what is known as the "unit system," with valves so located in the main header that each engine may be supplied from a separate boiler, independently of the other units. Individual boiler and engine leads are also valved so that any unit may be cut out.

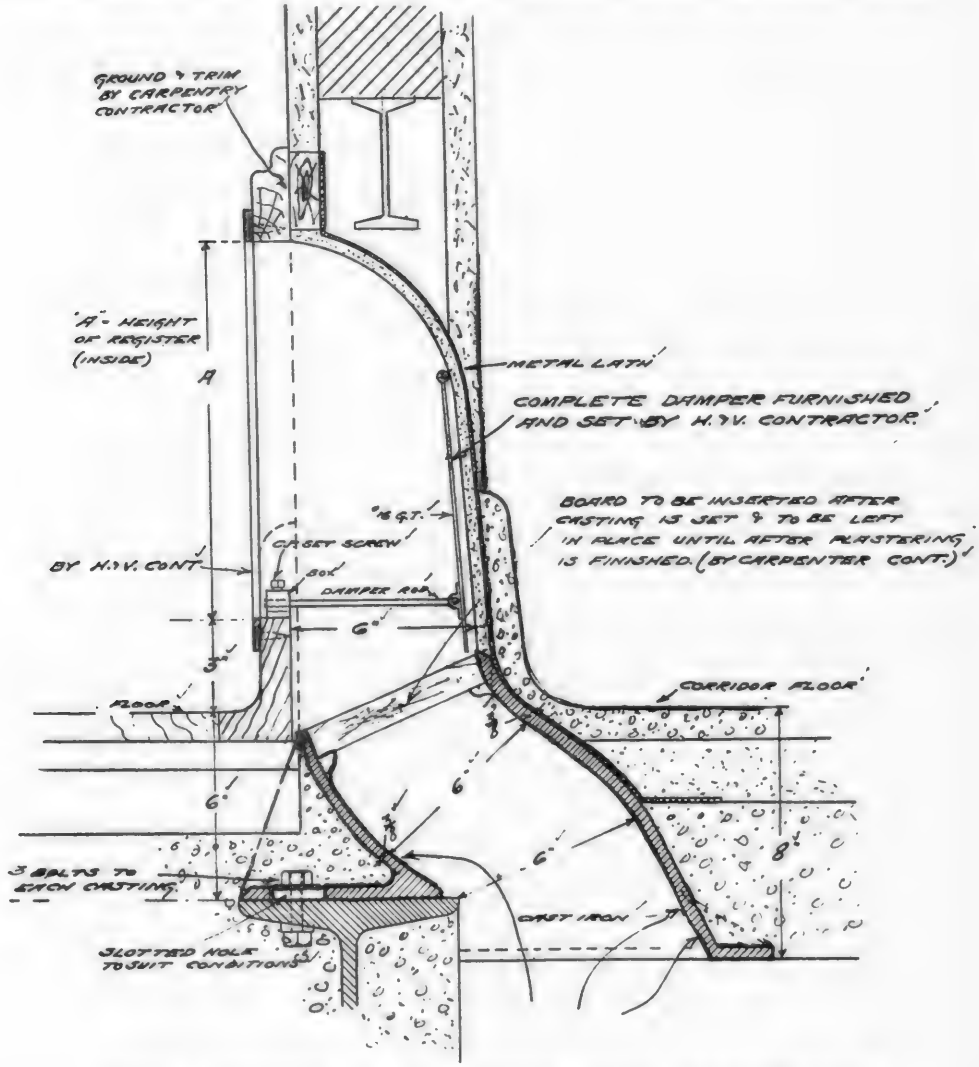
One of the features of this valving is that while the main piping is all located on the boiler room side of the division wall between engine room and boiler room, the main valves all have extension stems and hand wheels on the engine room side, so that they may be operated more easily at all times



SECTION OF FIRST FLOOR ON LINE G—G, ORIGINAL PLAN



TYPICAL CONNECTION TO FRESH AIR SUPPLY OPENINGS, SHOWN ON REVISED PLANS


GROUND & TRIM BY CARPENTRY CONTRACTOR
"A" - HEIGHT OF REGISTER (INSIDE)
METAL LATH
COMPLETE DAMPER FURNISHED AND SET BY H.&V. CONTRACTOR
BOARD TO BE INSERTED AFTER CASTING IS SET & TO BE LEFT IN PLACE UNTIL AFTER PLASTERING IS FINISHED (BY CARPENTER CONT.)
BY H.&V. CONT.
CA SET SCREW
BOX
DAMPER ROD
CORRIDOR FLOOR
FLOOR
3 BOLTS TO EACH CASTING
CAST IRON
SLOTTED HOLE TO SUIT CONDITIONS

TYPICAL CONNECTION TO VENT OPENINGS, SHOWN ON REVISED PLANS

from the higher elevation, and with more safety in case of a break in the boiler room piping.

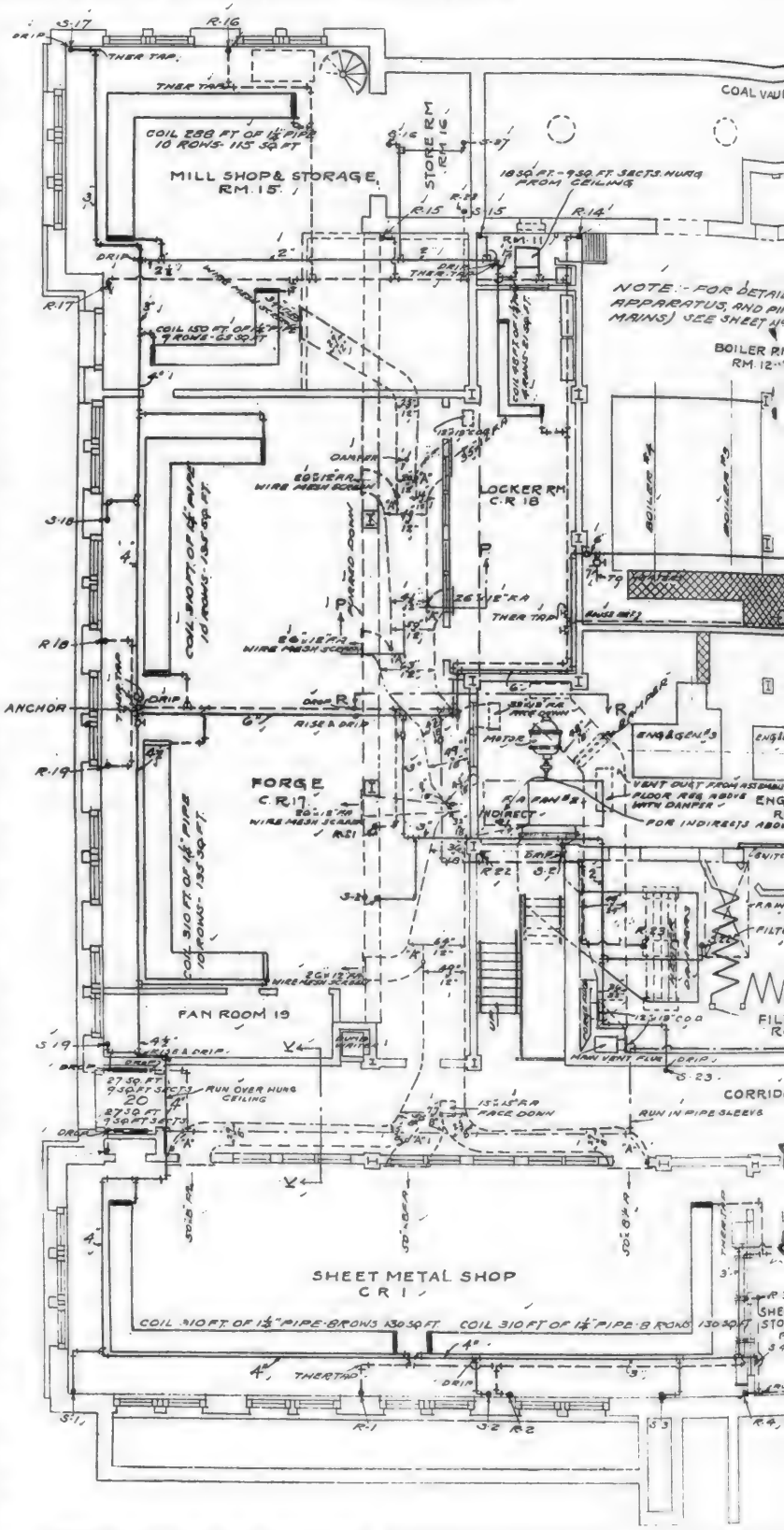
One other special feature of this piping, which may be noted, is that it is much smaller than that ordinarily used for units of these sizes, but extra large separators are provided for the engine leads, thus reducing the first cost of piping, radiation losses, etc., and securing the same operating results with small pipes and large separators, as would be the case with large pipes and smaller separators, except for this reduction in losses.

The unit system of piping employed, besides being a safeguard against breakdowns and allowing more flexibility of operation, is designed in part to afford facilities for testing as a part of the students' school work.

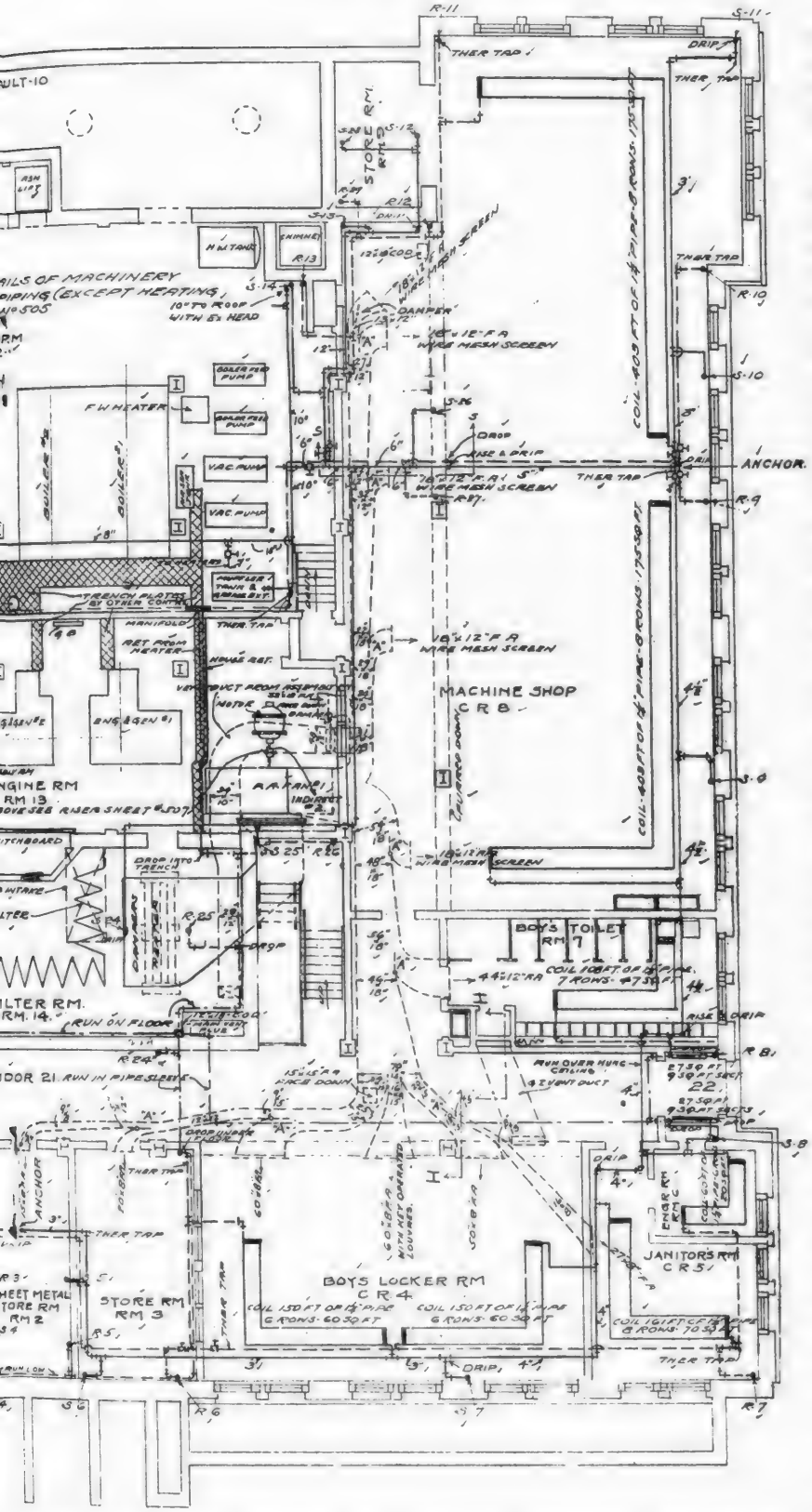
All of this piping, it will be noted, is erected with expansion bands and offsets, wherever they are essential to the flexibility of the system. No slip joints or other forms of expansion joints are used anywhere about the piping.

The generators are three-wire 120—240 volt direct current; over compounded just sufficiently to allow for drop in the engine speed, so as to give a flat voltage curve for all loads.

The generators are set on a sand cushion, being entirely isolated thereby from the building walls and columns, so


MILL SHOP & STORAGE RM. 15
STORE RM. RM. 16
COIL 288 FT OF 1½" PIPE 10 ROWS 115 SQ FT
COIL 150 FT OF 1½" 7 ROWS 65 SQ FT
COIL 310 FT OF 1½" PIPE 10 ROWS 130 SQ FT
LOCKER RM C.R 18
FORGE C.R 17
FAN ROOM 19
SHEET METAL SHOP C.R 1
COIL 310 FT OF 1½" PIPE 8 ROWS 130 SQ FT
COIL 310 FT OF 1½" PIPE 8 ROWS 130 SQ FT
ANCHOR
THER TRAP
DRIP
RISE & DRIP
RUN OVER HUNG CEILING
RUN IN PIPE SLEEVES
FACE DOWN
BOILER RM. RM. 12
COAL VAU

ORIGINAL PLAN OF BASEMENT, EAST SIDE COMMERCIAL AND MANUAL T



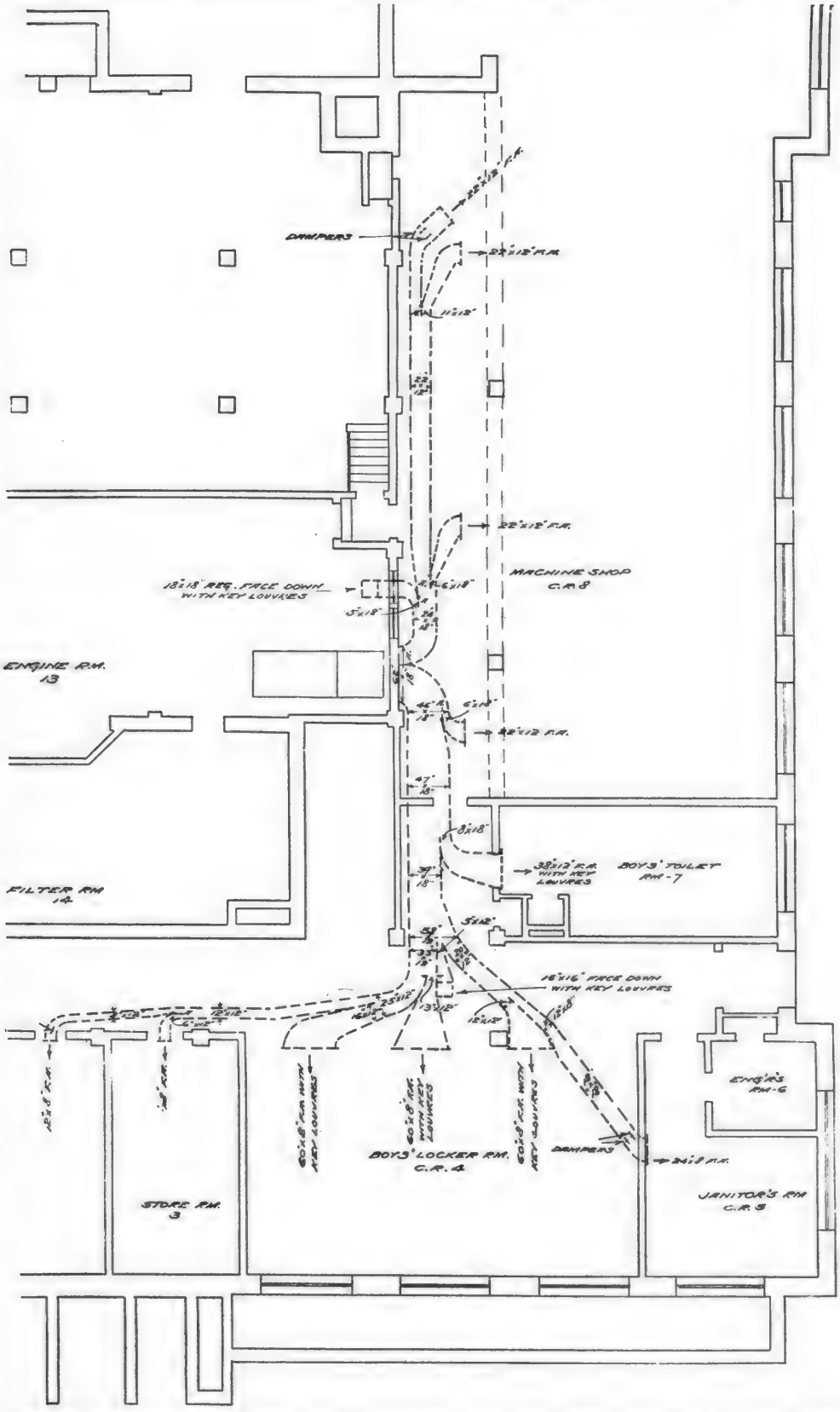
TRAINING HIGH SCHOOL, NEWARK, N. J., SHOWING MECHANICAL EQUIPMENT

as to prevent the transmission of any sound or vibration throughout the building.

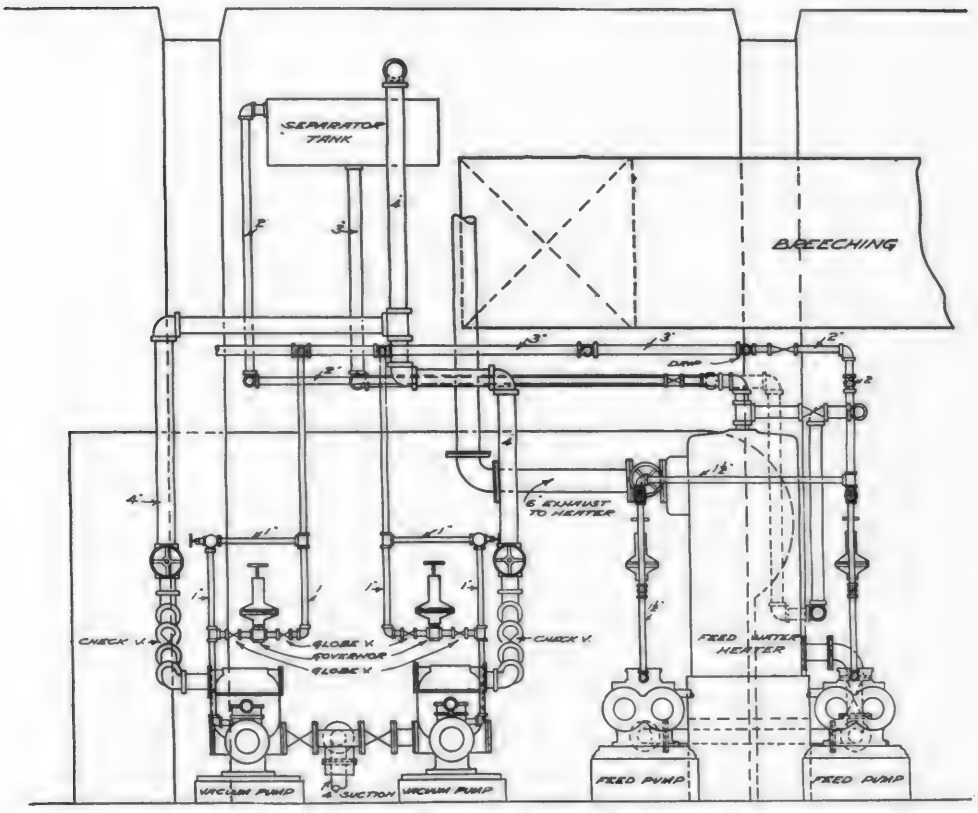
The main switchboard is one of the flush type, set in the face brick wall of the engine room, and arranged with bricked-in compartment in rear, for access to busbars, etc. All fuses are mounted on fuse boards in rear of the switchboard, where they are perfectly accessible and out of the way. The board consists of six blue Vermont marble panels, mounted with full copper finish, instruments and swinging voltmeter on the generator end. There are three generator panels, one lighting panel, one shop power panel and one fan power panel.

Two separate sets of busses and equalizers make it possible to operate the power and lighting loads absolutely independently, but a tie-over switch is provided between the two sets of busses and equalizers, so that the two loads may be carried in parallel whenever desired. Double throw main switches on the generator panels afford facilities for throwing any unit on either set of busses and equalizers, and a single pole double throw neutral switch makes it possible to throw both loads on to a unit which may be operating on the power or the lighting load only.

The lighting panel, the shop power panel and the fan power panel are each provided with an integrating wattmeter



REVISED PART PLAN OF DUCTS AND OPENINGS, BASEMENT, EAST SIDE COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL



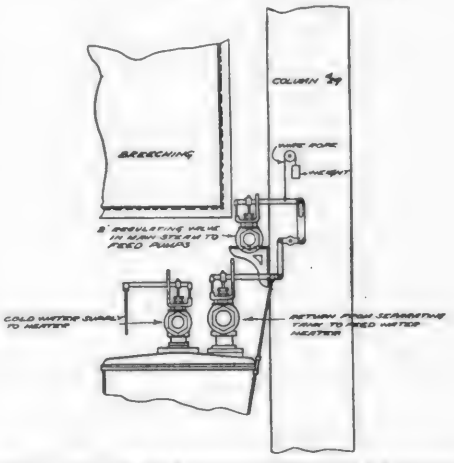
ELEVATION SHOWING CONNECTIONS AROUND PUMPS AND FEED WATER HEATER, EAST SIDE COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL, NEWARK, N. J.

for measuring the lighting, shop power and fan power output, separately, so that the costs on these several items may be kept separately.

THE HEATING AND VENTILATING SYSTEM

Primarily, the warming of the building is by direct radiation, placed in the various rooms and other spaces to be so heated, and is independent of the ventilation. We understand that this is the method being generally followed out in connection with all new school work in Newark, having been adopted after a thorough comparison with the several other systems in vogue in the principal city schools throughout the country. Wall radiation is used almost exclusively, and especially in class rooms where the exposure from broad expanse of wall and window areas requires long radiators for proper protection.

A great deal of care has been exercised in connection with the supporting of this type of radiation, so as to prevent leaks from deflection in the long radiators and to secure permanent, substantial and fire-proof hangers. Cast-iron hollow box-shaped grounds are first anchor bolted to the masonry walls and to these the iron brackets and toggle bolts for support-



SECTIONAL ELEVATION SHOWING ARRANGEMENT OF REGULATING VALVES AROUND FEED WATER HEATER

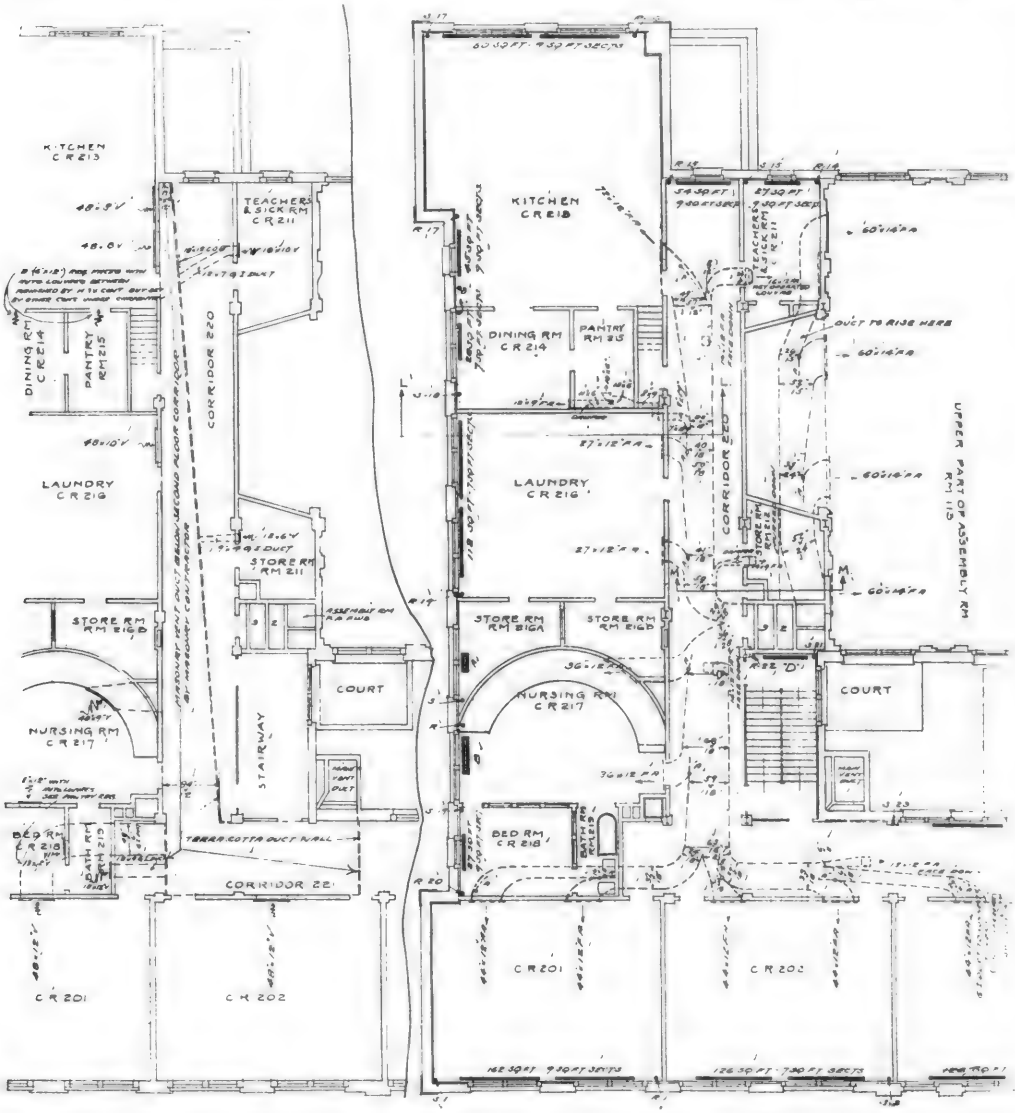
ing and anchoring the radiators are attached.

The assembly room is heated indirectly by separate cast-iron indirect stacks arranged in the basement in such a manner as to allow both the steam and air supplies to be cut off at any time this room is not in use.

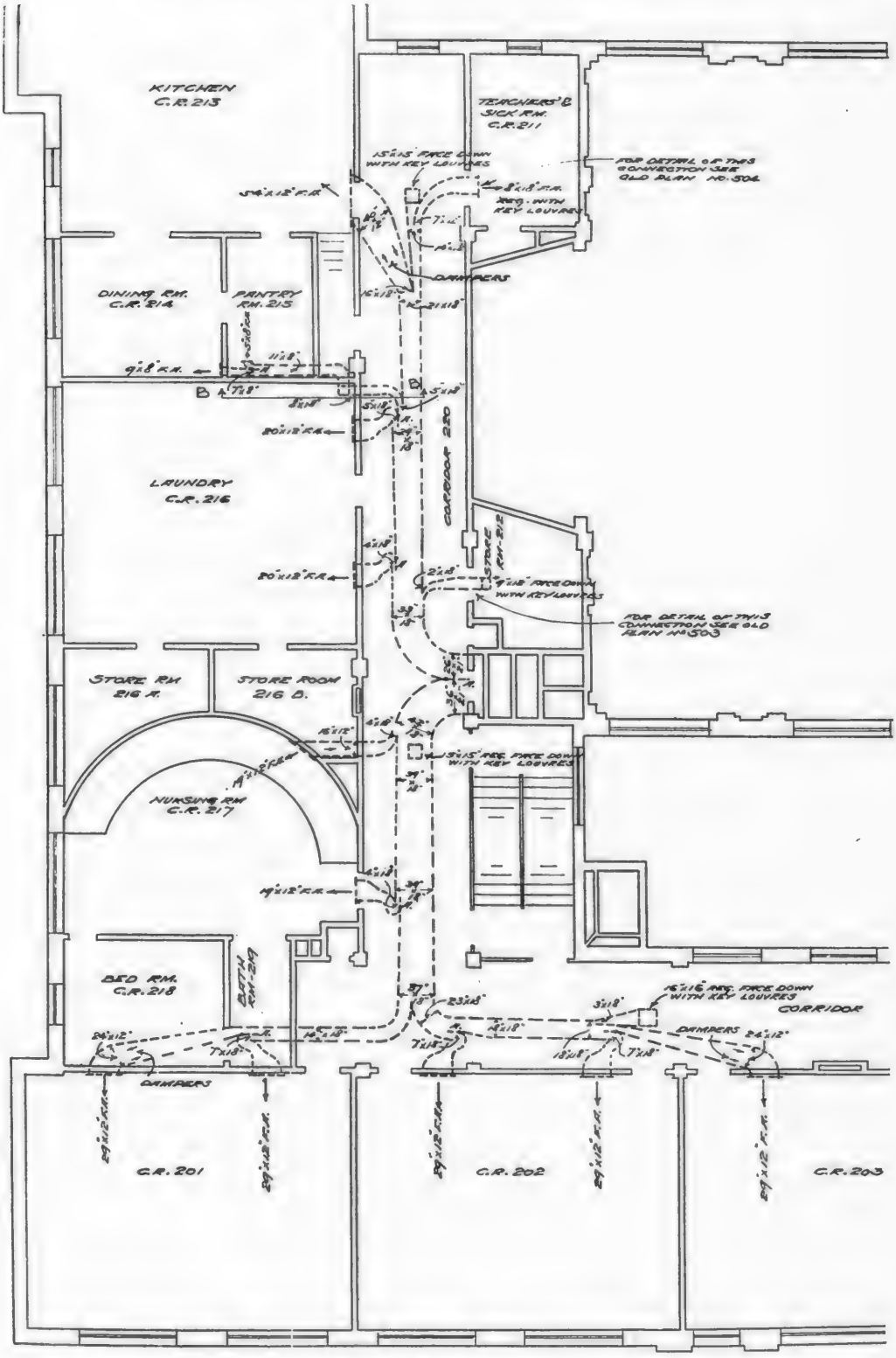
A separate skylight coil takes care of the principal exposure of this room so that its temperature will never drop below a point from which it may be brought up to normal conditions upon short notice. By the elimination of direct radiation in this room the double purpose is accomplished of preventing a waste of heat during unused periods, and of securing a better appearance.

The direct radiation is connected with a system of steam supplies and returns in the basement. All risers are valved at the base and the mains are divided into four separate systems by valves so as to allow the shutting down of these risers and sections for repairs.

Both the steam and return mains

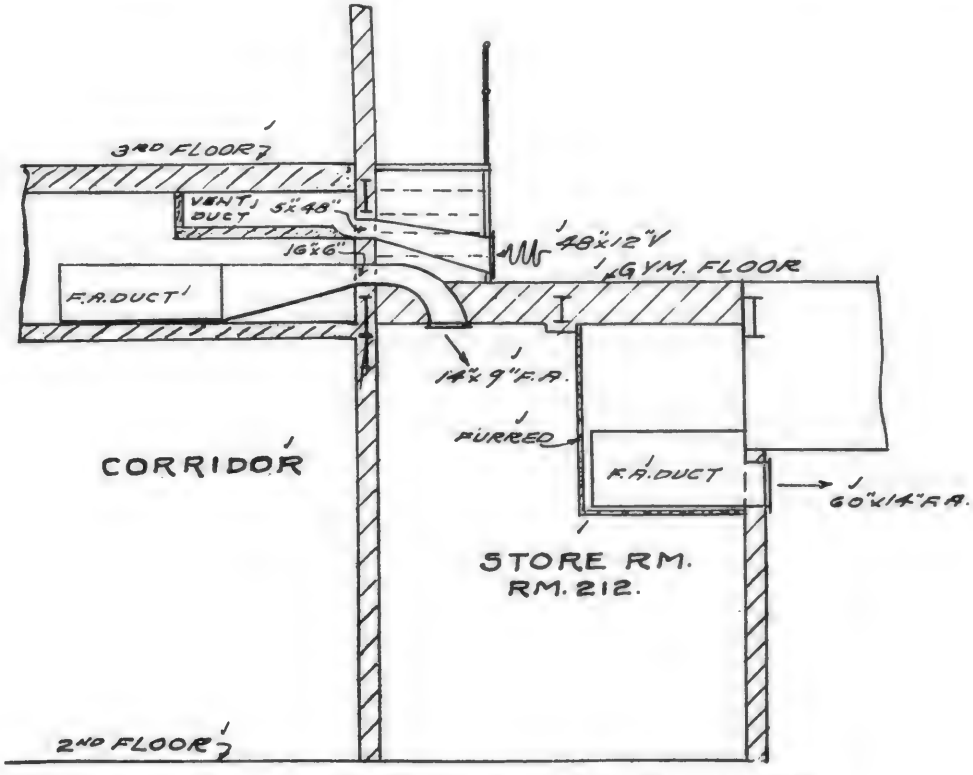


ORIGINAL PART PLAN OF DUCTS, SECOND FLOOR, EAST SIDE COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL



REVISED PART PLAN OF DUCTS, SECOND FLOOR, EAST SIDE COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL

run near the basement ceiling, thus avoiding unsightly and costly underground trenches, and at the same time keeping all piping above the water line, so as to permit of an emergency gravity return, when necessary. The entire system is fed by exhaust steam automatically supplemented by live steam and operated upon a regular vacuum system of steam and return circulation. The water of condensation is normally returned to the feed water heater by the vacuum pumps,

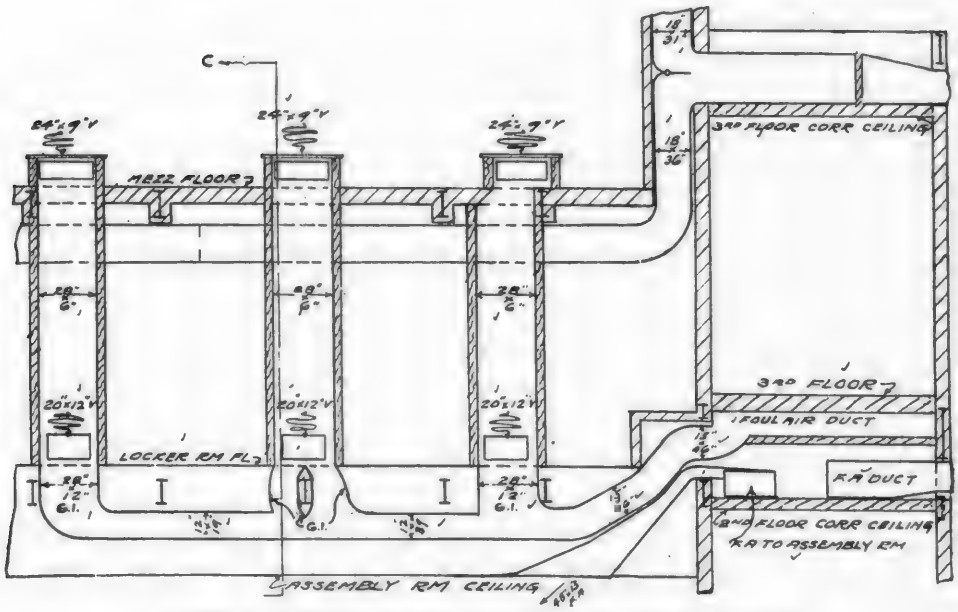


SECTION OF SECOND FLOOR ON LINE M—M, ORIGINAL PLAN

and from thence to the boilers, by the feed pumps, but may be bypassed directly to the boilers, in case of a breakdown in the vacuum system. In that case one or more of the boilers are temporarily thrown over to low pressure for the purpose.

In the returning of the water of condensation from the heating system to the boilers, every care has been taken to make this as nearly automatic as possible, and at the same time to prevent all unnecessary waste of heat and water. In addition to the usual float valve controlling the supply of city water to the feed water heater, a special float in this heater controls the supply from the separating tank above, so as to shut off this supply before the heater overflows. This practically makes an additional storage of the separating tank, thus preventing loss of hot water to the sewer until this tank overflows. The overflow from this tank is piped to the feed water heater inside of the float valve for affording a means of overflowing the heater for skimming purposes.

Attached to this special float lever is also an operating rod, controlling a regulating valve in the main steam line to the feed pumps, causing the entire apparatus to act as an automatic pump and receiver, as far as it is possible to do so with a high pressure plant. Thus, as the water rises in the heater, the same float opens the steam valve to the feed pumps, and cuts off the supply of water to the heater. The arrangement is such, of course, that



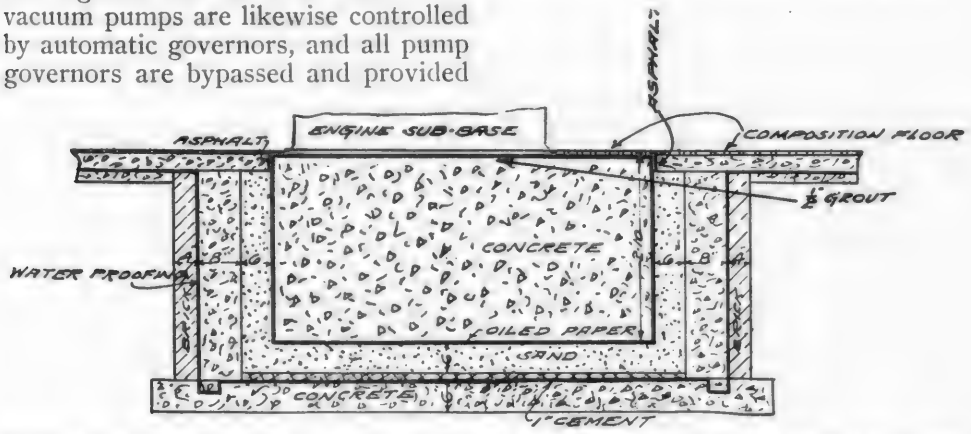
SECTION OF THIRD FLOOR ON LINE B—B, ORIGINAL PLAN

the pumps are never entirely shut off until the lowest level for this float is reached in the feed water heater, and are full on long before the water supply from the tank above is cut off.

The city water float is set at a lower lever still, so as to admit no cold water until absolutely necessary. The working of this auxiliary apparatus may be better understood by reference to the illustration showing a detail of this arrangement.

The steam supply to each feed pump is also provided with an automatic governor, controlled by the pressure in the feed mains for protecting this system against excessive strains. The vacuum pumps are likewise controlled by automatic governors, and all pump governors are bypassed and provided with throttles for hand regulation when desired.

The fresh air for ventilation is taken from an interior court, where the atmosphere is freest from dust and similar impurities, and after passing through filters is drawn in succession through the heater and fans. There are two main fresh air fans discharging directly into two banks of vertical fresh-air flues, one set of flues for each half of the building. Two separate flues are provided for each floor and from the top of these flues the air is distributed to the various rooms and spaces through galvan-



FOUNDATION FOR ENGINES DESIGNED TO PREVENT NOISE AND VIBRATION, EAST SIDE COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL

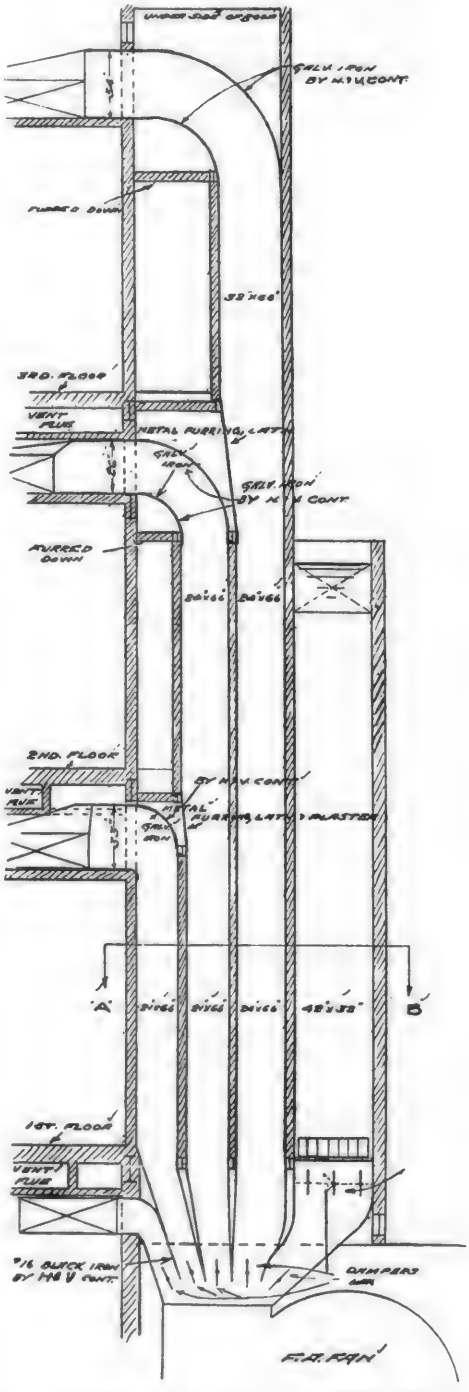
ized iron ducts run, generally, in furred spaces over the corridor ceilings. A main damper is located at the base of each flue for controlling the total volume of air supplied by same, and in addition, each outlet from the distribution ducts is provided either with a deflecting damper or a louvre register for controlling the supply to each room.

The fresh air supply openings to rooms are located near the ceilings and are not generally supplied with registers or grills of any kind, a specially constructed galvanized iron connection being made use of for distributing the air evenly. The foul air except from toilets, is exhausted from the building by two vent fans located in pent houses on the roof. The foul air from toilets is carried up independently to ventilators on the roof, so that the toilet ventilation has no connection whatever with the remainder of the foul-air system.

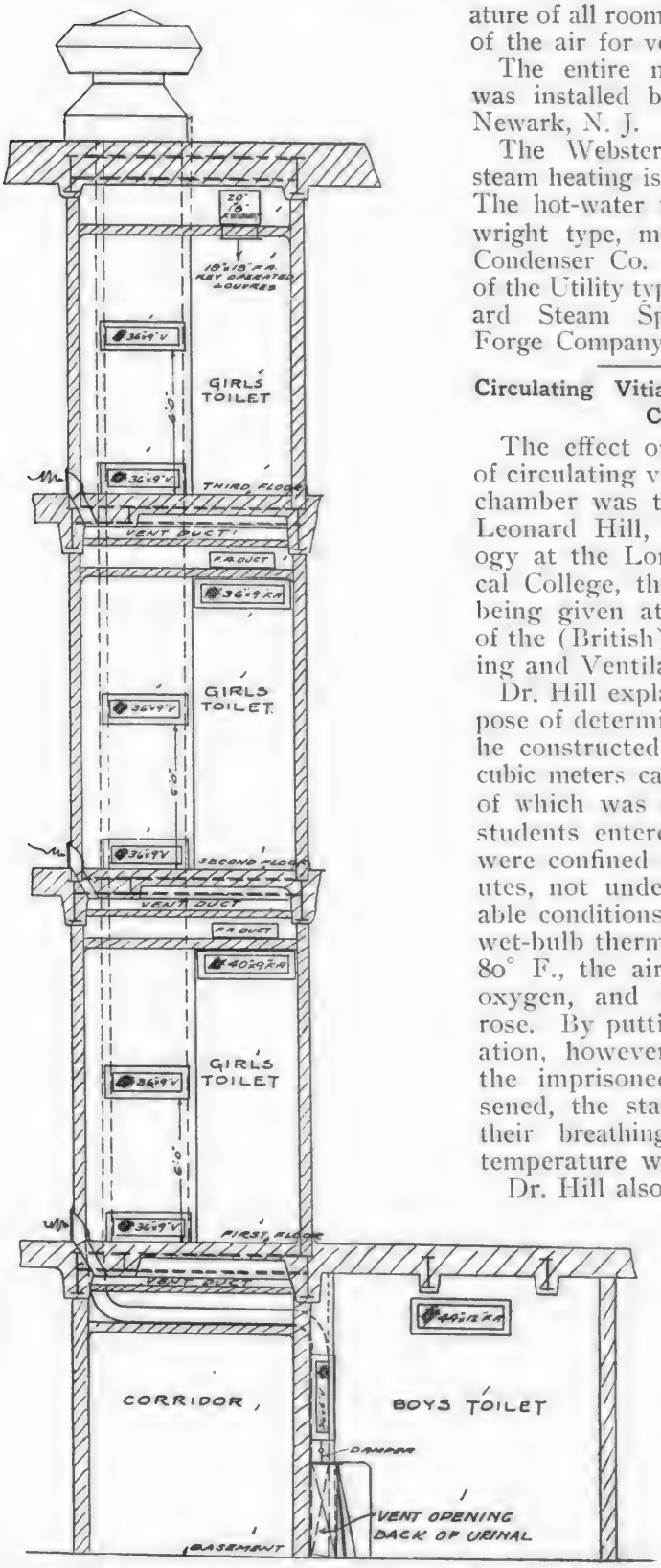
The foul air leaves the rooms through registers located near the floors, and passes down through a special cast-iron throat into masonry vent ducts located between the corridor floors and the fresh-air ducts. These corridor ducts are collected on each floor into two main vertical foul-air flues leading up to the roof fans. Each vent register opening is provided with a hinged damper for regulation. The roof fans discharge vertically above pent house roofs, where the foul air will be readily carried away. By this system of main vertical flues with the corridor distribution, and collecting ducts for fresh air and vents respectively, all vertical ducts in rooms are eliminated, and only such spaces as are not available for other purposes are utilized for these ducts and flues.

The location of a set of ducts on each floor for taking care of that particular story also greatly lessens the depth of such ducts. One set of main ducts on the basement ceiling often renders this story practically useless as to head room. The accompanying isometric sectional drawing shows the general idea of the ventilating system and illustrates very clearly the method of disposing the ducts and flues so as not to have same occupy valuable floor space, or interfere with head room.

A complete system of automatic temperature control regulates the temper-



CROSS SECTION THROUGH NORTH STACK, EAST SIDE COMMERCIAL AND MANUAL TRAINING HIGH SCHOOL



CROSS SECTION THROUGH SOUTH TOILETS

ature of all rooms and the temperature of the air for ventilation.

The entire mechanical equipment was installed by Storms & Co., of Newark, N. J.

The Webster system of vacuum steam heating is used in this building. The hot-water tank is of the Wainwright type, made by the Alberger Condenser Co. The oil extractor is of the Utility type, made by the Standard Steam Specialty Co. Buffalo Forge Company's fans are used.

Circulating Vitiated Air in a Closed Chamber

The effect on the human system of circulating vitiated air in a closed chamber was tried recently by Dr. Leonard Hill, lecturer on physiology at the London Hospital Medical College, the results of the test being given at the recent meeting of the (British) Institution of Heating and Ventilating Engineers.

Dr. Hill explained that for the purpose of determining his experiments he constructed a chamber of three cubic meters capacity, in the interior of which was a fan. Eight of his students entered this chamber and were confined there for thirty minutes, not under the most comfortable conditions, it was true, for the wet-bulb thermometer rose to about 80° F., the air was depleted of its oxygen, and the CO_2 percentage rose. By putting the fan into operation, however, the discomfort of the imprisoned students was lessened, the stale air did not affect their breathing, and the wet-bulb temperature was lowered.

Dr. Hill also referred to other experiments he had conducted on the same lines.

Such experiments went to convince him that, in the interests of workers, a greater amount of attention should be given to ensure gentle and constant movement of the air in confined areas.

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IT IS quite within the realm of probabilities that the use of ozone as an adjunct to heating and ventilating systems will be the next important step in the advance of the art, as was the introduction of the air washer a few years ago. It is becoming more and more apparent that, in many cases, the most perfectly designed ventilating systems, from an engineering standpoint, cannot meet all the conditions that are likely to arise, or at least, cannot adjust themselves to these changes with the necessary degree of ease and promptness. No one can read such observations as those made by Dr. Evans, Chicago's commissioner of health, regarding the conditions actually found in that city's public school buildings, without realizing that the best of heating and ventilating systems will not always fulfil the requirements.

It is here that the ozone devices have their usefulness and heating engineers will do well to adopt, even experimentally, this device rather than allow it to develop itself in a spirit of competition with the accepted types of ventilating apparatus. It can be said with authority that the leading makers of ozone devices are ready to coöperate on a broad scale with the heating profession in the use of ozone in ventilating work. It is equally certain that the manufacture of ozone has reached a point where it can and probably will make an independent appeal to the general public.

AFTER all, it is the man whose mind is not too closely devoted to his particular line who makes the really constructive criticisms of that line. A correspondent, for instance, writes us: "I believe we are on the threshold of a good air era and if a department more popular in its nature were made a part of your magazine and your circulation extended to reach school teachers, church boards, lodge-room officials, proprietors of cafés and restaurants and theaters, as well as the general class of clerks that are more or less victims in all large cities of improper air conditions in confined spaces, you could greatly enhance your usefulness in promoting the art. Your journal, as the leader in this field, must naturally reflect its progress, both in its circulation and its enlarged effectiveness. It certainly seems to the writer that your subject can make a broader appeal than 'Popular Electricity' and 'Popular Mechanics' combined if you recognized the possibilities of popularizing 'The Necessity of Good Air.'"

It may be added that our correspondent's idea has seemed so good to us that we are planning to inaugurate in an early issue, a department on the lines above indicated.

Current Heating and Ventilating Literature

Under this heading is published each month an index of the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the articles mentioned may be obtained from THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

Air Washing.—The Mechanical Purification of Air. C. L. Browne. Describes apparatus for washing and filtering air. 3,800 words.—Cassier's—Oct. 40c.

Car Ventilation.—Car Ventilation. B. W. Stowe. Paper read at Meeting of Association of Railway Electrical Engineers, Chicago, Sept 29-30, 1910. 1,600 words. El Tr Wkly—Oct. 8, 1910. 20c.

Exhaust Steam, Uses of. Central-Station Economy. P. E. Matteson. III. —Exhaust Steam. 1,800 words. El Rev and W Electn—Oct. 1, 1910. 20c.

Mine and Ventilation.—The Coefficient of Friction. William Clifford. Discusses the difficulty of calculating the necessary pressure by estimating the rubbing surface, and contends that each mine has its own particular coefficient. 2,500 words. Mines & Min—Oct.

Ventilating Fan.—A Three-Phase Electric Ventilating Outfit with Speed Control. Describes use of three-phase motor for operating ventilating fan; also method of controlling speed. 1,700 words. Ind Elec—Sept. 10. 60c.

A Few Facts About Peat Fuel

The following items regarding peat and its increasing use as fuel is supplied to us through the courtesy of Mr. L. B. Lincoln, vice-president of the Canadian Peat Society:

About 10,000,000 tons of peat fuel are yearly produced in Europe.

Russia is the largest producer of peat fuel, her output in 1902 being 4,000,000 tons, which has increased 200,000 tons a year since then.

1,300 plants making machine peat are now in operation in Russia.

The United States, exclusive of Alaska, is estimated to have 11,200 square miles of peat bogs, averaging 9 ft. in depth, and containing nearly 13,000,000,000 tons of fuel worth at $3.00 a ton—$39,000,000,000.

Canada has 37,000 square miles (23,680,000 acres) of known peat bogs, but these form probably but a small fraction of the total, constituting a potential national asset of enormous value.

Some idea of the possibilities may be gained from the estimate that 28 acres of peat 9 ft, deep should yield 50,000 tons; enough to supply 100 families for 25 years, allowing 20 tons per annum to each family, or enough to furnish a power plant of 100 h. p., using steam engines, with fuel for more than 25 years of 300 ten-hour days, allowing 12 lbs. of fuel per H. P. hour developed. The fuel, if used in a suitable gas producer, would last the same plant about 100 years.

Four bogs within a few miles of Ottawa examined by Government experts, are estimated to contain over 25,000,000 tons of fuel.

The Provinces of Ontario and Quebec send $20,000,000 a year to the United States for coal. The development of some of our extensive peat bogs will help to keep some of this money at home and to furnish additional employment to Canadians in Canada.

CANADIAN GOVERNMENT PEAT PLANT

To reëstablish confidence in the value of peat as a domestic and industrial fuel, and to stimulate development of our peat resources, the Canadian Government has acquired 300 acres of peat bog at Alfred for the purpose of manufacturing peat fuel on a commercial scale by a method which has proved successful in Europe.

The capacity of the plant is 30 tons per day, and during part of the past summer 1,600 tons of machine peat have been produced.

Allowing 140 days for a season's operations, the cost of the fuel on the field is $1.40 per ton, under conditions existing at the government plant. By the use of larger plant and using mechanical excavators to replace hand labor, their cost of production can be greatly reduced.

Three thousand six hundred lbs. of the machine peat is equal to colorific value to a ton of anthracite coal.

The machine peat, if sold at $3.25 per ton, would, therefore, be the economic equivalent of anthracite coal at $5.85 per ton.

Death of William H. Bryan, Recently Appointed Chief Engineer to the Chicago Board of Education

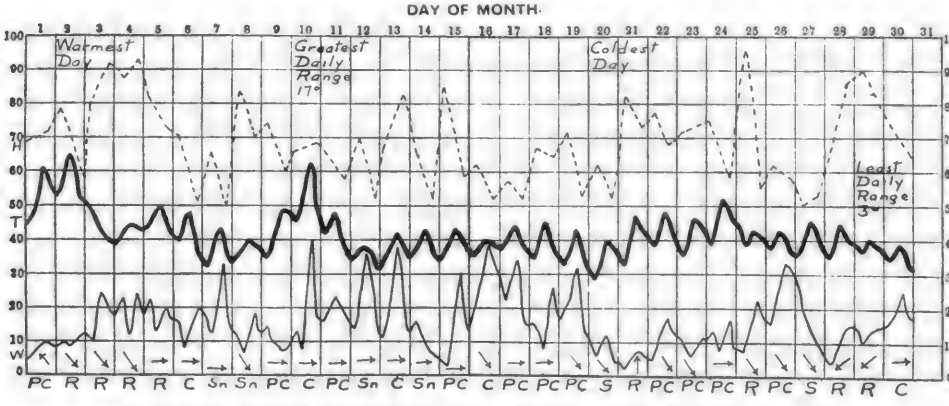
William H. Bryan, late of St. Louis, and recently appointed chief engineer to the Chicago Board of Education, died suddenly at his hotel in Chicago December 6. His appointment as chief engineer was of November 28, so that he held office for scarcely a week. He was about 50 years old.

Mr. Bryan was well-known in the heating profession. He was a member of the American Society of Mechanical Engineers and of the American Society of Heating and Ventilating Engineers. He had long been engaged in consulting work in St. Louis, and took an active part in both the professional and social features of the heating engineers' meeting in St. Louis last summer.

The Weather for November, 1910

	New York	Boston	Pittsburg	Chicago*	St. Louis
Highest temperature, degrees F.	65	61	63	67	73
Date of highest temperature	2	2	9	9	9
Lowest temperature, degrees F.	29	26	24	20	21
Date of lowest temperature	20	20	30	30	30
Greatest daily range, degrees F.	17	20	29	29	31
Date of greatest daily range	10	21	9	7	27
Least daily range, degrees F.	3	5	2	3	4
Date of least daily range	29	4	16	27	15
Mean temp. for month, degrees F.	42	41	37	36	42
Normal temp. for this month	44	42	42.6	39.2	45
Total rainfall, inches	4.62	3.75	1.32	1.31	0.30
Total snowfall, inches	Trace	1.4	1.6	1.3	None
Normal precipitation, this month, inches	3.44	4.03	2.32	2.50	2.81
Total wind movement, miles	10506	8013	10234	9377	8143
Average hourly wind velocity, miles	14.6	11.1	14.2	13	10.9
Prevailing direction of wind	West	West	West	West	N. W.
Number of clear days	2	3	1	5	14
Number of partly cloudy days	14	12	6	10	6
Number of cloudy days	14	15	23	15	10
Number of days on which rain fell	8	8	17	13	3
Number of days on which snow fell	Trace	5	12	6	None
Snow on ground at end of month, inches.	None	None	0.3	1	None

*The temperature averaged much lower than usual, the mean, 36°, being the lowest since 1903. These figures are in strong contrast with the warm November of 1909, when the mean temperature was 48°.


DAY OF MONTH
Warmest Day
Greatest Daily Range 17°
Coldest Day
Least Daily Range 3°
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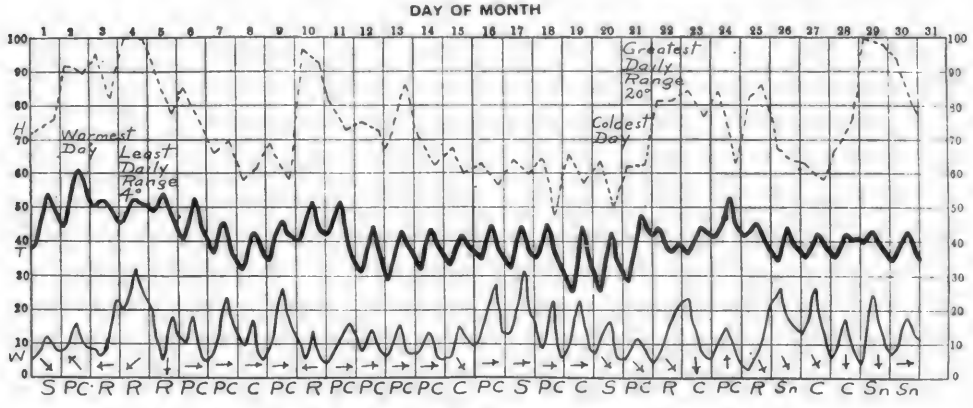
RECORD OF THE WEATHER IN NEW YORK FOR NOVEMBER, 1910


DAY OF MONTH
Greatest Daily Range 20°
Warmest Day
Least Daily Range 4°
Coldest Day
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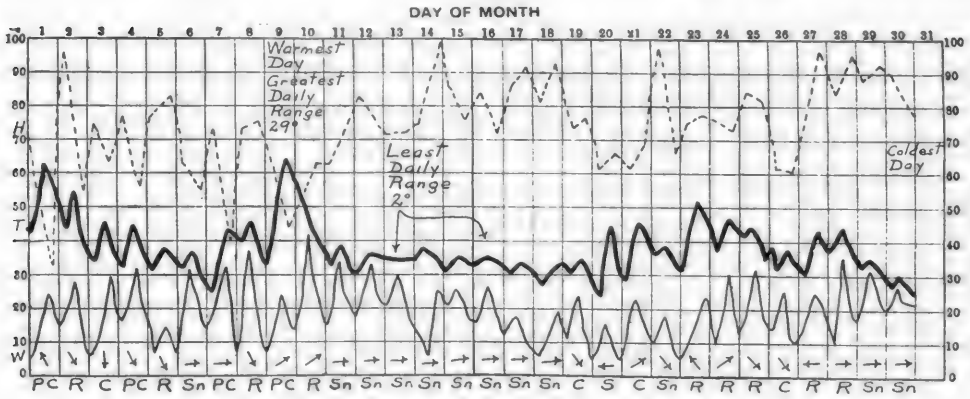
RECORD OF THE WEATHER IN BOSTON FOR NOVEMBER, 1910


DAY OF MONTH
Warmest Day
Greatest Daily Range 29°
Least Daily Range 2°
Coldest Day
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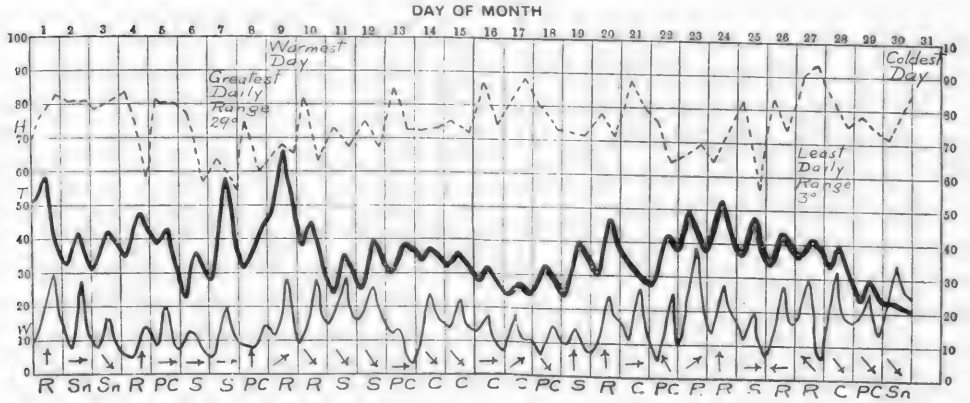
RECORD OF THE WEATHER IN PITTSBURG FOR NOVEMBER, 1910


DAY OF MONTH
Warmest Day
Greatest Daily Range 29°
Coldest Day
Least Daily Range 3°
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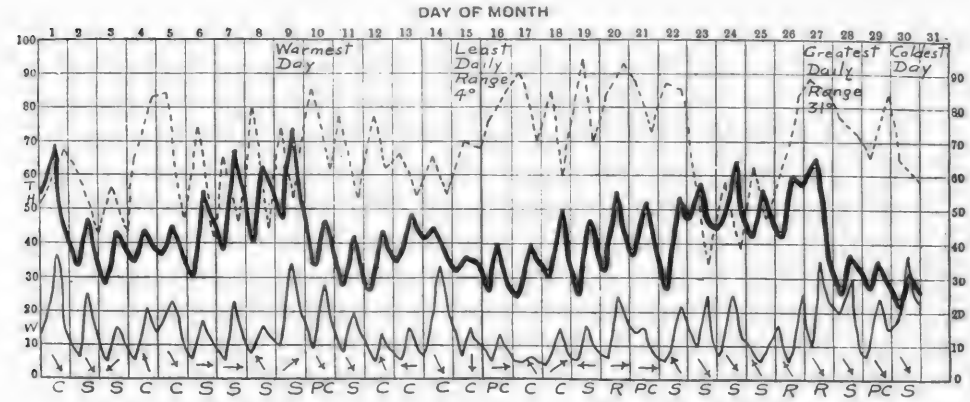
RECORD OF THE WEATHER IN CHICAGO FOR NOVEMBER, 1910


DAY OF MONTH
Warmest Day
Least Daily Range 4°
Greatest Daily Range 31°
Coldest Day
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RECORD OF THE WEATHER IN ST. LOUIS FOR NOVEMBER, 1910

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE by the United States Weather Bureau.

Heavy lines indicate temperature in degrees F.

Light lines indicate wind in miles per hour.

Broken lines indicate relative humidity in percentage from readings taken at 8 A. M. and 8 P. M.

S—clear, P C—partly cloudy, C—cloudy, R—rain, Sn—Snow.

Arrows fly with prevailing direction of wind.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

The 1911 Ballot

Following is the completed ballot containing the nominees for 1911 in the American Society of Heating and Ventilating Engineers:

FOR PRESIDENT

Reginald Pelham Bolton, New York.
B. F. Stangland, New York.

FOR FIRST VICE-PRESIDENT

John R. Allen, Ann Arbor, Mich.
S. R. Lewis, Chicago.

FOR SECOND VICE-PRESIDENT

Albert B. Franklin, Boston.
F. R. Still, Detroit.

FOR SECRETARY

William M Mackay, New York.
Charles E. Scott, New York.

FOR TREASURER

U. G. Scollay, Brooklyn, N. Y.
D. D. Kimball, New York.

Considerable interest attaches to the nominations for secretary, a movement having been set on foot to nominate W. W. Macon, of New York, as one of the candidates for this office.

W. W. Macon to Run Independently for Secretary

In a circular letter which is described as a "statement to the members of the American Society of Heating and Ventilating Engineers regarding the candidacy of Mr. W. W. Macon for the office of secretary of the society" and signed by seven of the society's past presidents, the announcement is made that Mr. Macon will run as an independent candidate for the office. The letter is signed by Stewart A. Jellett, Prof. R. C. Carpenter, Wiltsie F. Wolfe, Henry Adams, D. M. Quay, C. B. J. Snyder and William G. Snow.

Enlargement of the Society's Membership

The membership committee has sent out a notice signed by D. D. Kimball, chairman, and W. M. Mackay, secretary, in connection with the forward movement to increase the society's membership. Speaking of the society and its work, the notice says:

The society is over sixteen years old, and it is the only society devoted exclusively to this art; has a membership of nearly four hundred; has two meetings yearly; its proceedings and papers are regularly published; it is active in promoting legislation on the subject of ventilation; it is interested in all of the problems of heating, fresh-air supply, humidity, standards of measurements, and in the laws of conduct in an engineering sense. A consistent effort is being made to make a discriminating selection of candidates for membership, to make the paper and topics of the coming meetings attractive to the best heating and ventilating engineers, and to make the society a leader in its field.

Meeting of Illinois Chapter

At the November meeting of the Illinois Chapter held Nov. 14, in Chicago, the committee which has been at work in association with the city's health board in drafting a new code for securing better ventilation in various classes of buildings in the city, reported that such a proposed code will be presented to the city council for adoption probably by Feb. 1 next. Efforts are also being continued to obtain the passage of the Chapter's compulsory ventilation bill by the State Legislature and it is possible action will be taken at the present session.

NATIONAL ASSOCIATION OF MASTER STEAM AND HOT WATER FITTERS

An Open Letter to Master Steam Fitters

"Are You a Master Steam Fitter? If Not—Why Not?" is the title of a 12-page leaflet recently sent out to the trade by the National Association of Master Steam and Hot Water Fitters, New York. Readers of the circular who are not master steam fitters will, no doubt, feel properly rebuked on reading the challenge contained in the title. It appears, however, from the contents of the circular that it is an appeal to master steam fitters to affiliate themselves with the National Association of Master Steam and Hot Water Fitters. The advantages to be derived from such membership are detailed at length. An application for membership blank is attached which contains the rates of dues for the seven different classes of membership, the rates depending upon the amount of business transacted annually by the members.

Next Annual Convention Planned for Chicago

It is probable that the twenty-third annual convention of the National Master Steam and Hot Water Fitters will be held in Chicago, June 5-8, 1911. The possibility of holding the convention in the Windy City was announced in a recent issue of the association's Official Bulletin and has met with an enthusiastic response on the part of the trade in Chicago and the Middle West.

It is proposed to make this convention an open one in which members as well

as non-members will have the privileges of the floor.

There are two independent organizations of master steam fitters in Chicago, one being known as the Chicago Master Steam Fitters' Association with a membership of twenty and the other having as its title the Chicago Steam Heating and Ventilating Engineers. This body has about 100 members. The National Association for many years has not been represented by its membership in Chicago and an effort will no doubt be made to bring the Chicago trade and the National Association into more harmonious relations.

American Society of Mechanical Engineers

The annual meeting of the American Society of Mechanical Engineers was held at the Engineering Societies Building, New York, December 6-9 and was one of the largest attended meetings in the history of the society. Among the special features of the meeting was a reunion and dance at the Hotel Astor on the evening of December 7, and a tea at the St. Regis Hotel, December 8, given by Mr. and Mrs. George Westinghouse.

The papers presented included the following: "The Transmission of Heat in Surface Condensation," by George A. Orrok; "Combustion and Boiler Efficiency," by Edward A. Uehling; "Automatic Control of Condensing Water," by B. Viola, and "Notes on the Value of Napier's Coefficient with Superheated Steam," by Issac Harter, Jr. Reginald Pelham Boston, one of the candidates for president of the American Society of Heating and Ventilating Engineers presented a paper on "Operating Conditions of Passenger Elevators."

National District Heating Association

The executive committee of the National District Heating Association has decided to hold the third annual meeting of the association in Pittsburg in June, 1911.

American Institute of Chemical Engineers

The third annual meeting of the American Society of Chemical Engineers was held at the Hotel Astor, New York, Dec. 7-10. Among the papers read were the following:

"The Development of the Chemist as an Engineer," by Dr. Fred W. Atkinson, president of the Polytechnic Institute of Brooklyn.

"The Fitzgibbons Boiler," by Jerome Alexander.

"Manufacture of Lignite Briquettes," by Henry S. Renaud.

Modern Science Club

Lectures are announced at the Modern Science Club, 125 So. Elliott place, Brooklyn, N. Y., as follows: Dec. 6, lecture on "The Manufacture and Use of Lubricating Oils," by L. G. Benton, of the Norben Oil Co.; Dec. 13, lecture on "Entropy," by Fred Low, editor of Power and The Engineer; Dec. 20, lecture on "Wattmeters," by W. F. Howe, of the General Electric Co.

National Employment Exchange of New York

The first annual report of the National Employment Exchange, of New York, has been published. It may not be generally known that this exchange was organized in 1909 to establish an employment bureau that would inspire confidence on the part of employers' employees. In order to insure its permanency the exchange is conducted as a business and not as a charity. The purpose, however, is usefulness and the motives philanthropic. The primary effort is to fill orders for employees in a satisfactory manner with good material. The exchange maintains a general mercantile bureau at 47 West 42d street and a manual labor branch at 14 State street (Battery Park).

The exchange was established by a number of wealthy men in New York, who subscribed a total of $100,000 for its endowment. During the period from May, 1909, to Sept. 30, 1909, the exchange placed in employment 4,120 men. From Nov. 19, 1909, to Sept. 30, 1910, during which time a much larger office was operated at 47 West 42d street, a total of 537 situations were secured for applicants.

United States Radiator Corporation Absorbs the Smith & Thayer Company

Announcement is made that the United States Radiator Corporation has purchased the property and business of the Smith & Thayer Company, Boston, Mass., makers of the well-known Winchester boilers. The principals of the Smith & Thayer Company, W. H. Thayer and F. K. Pittman, will be associated with the United States Radiator Corporation in the management of its New York and New England business.

It is the intention of the corporation to continue the manufacture of the Winchester boilers, which will be distributed in the territories as heretofore. It is also the intention of the corporation to handle the complete line of goods now handled by the Smith & Thayer Company.

The arrangement will go into effect with the beginning of the new year.

CORRESPONDENCE

An Old Letter Head

EDITOR HEATING AND VENTILATING MAGAZINE:

I ran across this old letter head the other day written in 1892 on the heading of the Master Steam and Hot Water Fitters' Association:

The Master Steam and Hot Water Fitters' Association of the United States

OFFICERS FOR 1892-93

P. S. Hudson, president, 193-7 Van Buren Street, Chicago.

E. Rutzler, first vice-president, 178-180 Centre Street, New York.

H. D. Crane, second vice-president, 92 Central Avenue, Cincinnati, Ohio.

Edward P. Bates, third vice-president, 228 W. Water Street, Syracuse, N. Y.

George H. Reynolds, secretary, 628 Rialto Building, Chicago.

F. W. Lamb, treasurer, 258 Michigan Street, Chicago.

D. F. Morgan, sergeant-at-arms, Akron, Ohio.

EXECUTIVE COMMITTEE

L. H. Prentice, 203 Van Buren Street, Chicago.

C. H. Simmons, 72-74 Market Street, Chicago.

John Davis, 69-79 Michigan Street, Chicago.

F. W. Lamb, 258 Michigan Street, Chicago.

H. A. Kroeschell, 41-55 Erie Street, Chicago.

You will notice at that time nearly all the officers and all the executive committee were located in Chicago. At the present time the association has no members at all in Chicago, while all the officers are in the east. What is the reason for this, if any?

JAMES E. HEG.

New York, October, 1910.

For Better Street Car Ventilation in the District of Columbia

The District Electric Railway Commission, Washington, D. C., is preparing to inaugurate the most exhaustive investigation it has ever undertaken, with a view of better ventilation for patrons of street cars.

Secretary H. C. Eddy, of the commission, is compiling a report on new ventilating systems, designed principally for winter use, either of which, if adopted and incorporated in a regulation to be issued by the commission, would completely change the present method of ventilating the District street cars.

A New Weather Strip

Ford's Air-Tight All Wood Weather Strip is one of the latest type of devices designed to prevent air leakage around windows. The strip is made of Southern pine, which was chosen as it is a wood that will not swell or shrink to any appreciable extent. The wood is first thoroughly seasoned and then given a bath in oil.

The strip consists of two neatly designed mouldings, as shown in the cut,

NEW AIR-TIGHT ALL WOOD WEATHER STRIP

groove, and tongue, so that when applied they close together in such a manner as to make an air-tight joint.

Door sizes of these weather strips come in three lengths, 7, 8 and 9 ft., and window size in two lengths, 7 and 9 ft. The center or double door strip is a special one, and is used with the regular groove, door size.

The strip is made and sold by the Ford Mfg. Co., Holyoke, Mass.

Dustman's Book of Plans and Building Construction, by U. M. Dustman, is a new work containing the plans for 150 modern houses, bungalows, barns, etc. In some cases the heating plans are shown. The book is intended for general contractors and home builders and contains a quantity of information on the various features of building construction, including a glossary of terms used in carpentry. The illustrations are, in many cases, from photographs and the plans selected represent an experience on the part of the author of over 30 years. Size 13½ x 9½ in. Pp. 240. Price $2.00. Published by the Charles C. Thompson Co., 549 Wabash avenue, Chicago, Ill.

Standard Practical Plumbing, by R. M. Starbuck, is a recently-published book, designed to cover plumbing in all its branches, including hot water supply and circulation and range boiler work. The book contains 347 illustrations. Size 6½ x 9¼ in. Pp. 450. Price $3.50. Published by the Norman W. Henley Publishing Co., 132 Nassau street, New York.

TRADE AND MISCELLANEOUS NOTES

Coming Events

Jan. 24-26, 1911.—Seventeenth annual meeting of the American Society of Heating and Ventilating Engineers, New York. Headquarters at the Engineering Societies Building, 39 West 39th Street.

Deaths

John Harlin, one of the founders of the well-known firm of the McNab & Harlin Mfg. Co., New York, manufacturers of brass and iron valves, cocks and fittings, died at his home in New York, Oct. 28. He was 74 years old. Mr. Harlin commenced the manufacture of brass goods over 50 years ago at the company's address and was one of the pioneers in the manufacture of valves.

Robert Sproul, a member of the heating and plumbing firm of Sproul & McGurrin, Grand Rapids, Mich., died of apoplexy at his home in that city Oct. 31. Mr. Sproul was 59 years old and was well known in the trade throughout the middle west. He was a native of Scotland but had been in the United States since 1869. His partnership with William T. McGurrin was formed in 1876 and lasted for nearly 35 years, until Mr. Sproul's death. Mr. Sproul is survived by a widow, two sons and one daughter.

Ralph S. Buck, vice-president and manager of the Bridge & Beach Mfg. Co., St. Louis, Mo., died at his home in St. Louis, November 11. He was 50 years old. Mr. Buck was formerly secretary of the Buck Stove and Range Co., of St. Louis, which was the outgrowth of a firm established by his father, Charles H. Buck, in 1846. He resigned in 1888 and has since been connected with the Bridge & Beach Mfg. Co.

William C. Joy, formerly president of the Joy Radiator Co., Titusville, Pa., which was taken over some years ago by the American Radiator Co., died at his home in New York, November 11. He was 77 years old. At the time of

ENGINEERS AND STEAMFITTERS REQUIRE GOOD TOOLS

The GENUINE ARMSTRONG Stocks and Dies are

RELIABLE, ACCURATE, EASY WORKING

MANUFACTURED BY

THE ARMSTRONG MFG. CO., 321 Knowlton St., BRIDGEPORT, CONN.

ROBERT A. KEASBEY CO.

"RAKCO" BRAND PACKINGS and GASKETS OF ALL KINDS

100 North Moore Street
NEW YORK CITY

Send for Sample of "RAKCO" Red Rubber Sheet Packing, Style No. 10.

Telephone 6097 Franklin

his death he was connected with the American Radiator Co.

Manufacturers' Notes

Consolidated Casting Co., Mechanicsville, N. Y., is the title of the consolidation of the Turnbull-Smith Co., Syracuse, N. Y., and the Greene Plating Co., Mechanicsville. The Syracuse plant will be operated as a branch and the plant at Mechanicsville will be enlarged by additions to its brass foundry.

McCrum-Howell Co., New York, announces that it will soon commence the erection of a 4-story addition to its plant at Racine, Wis., for the manufacture of electric motors for its stationary vacuum cleaners.

Mayor, Lane & Co., New York, jobbers of heating and plumbing supplies, announce the removal of their quarters from 128-132 White street to Hudson and Charlton streets.

Steel Radiation, Ltd., Toronto, Can., has purchased a site on the Lachine Canal, Montreal, where it will shortly erect a foundry plant, employing 500 men.

Pressed Radiator Co. of America, Pittsburg, Pa., announces the appointment of George B. Carr as manager of its Chicago branch. Mr. Carr succeeds Mr. J. F. Siegel, who is now the company's general sales manager.

Walworth Mfg. Co., Boston, Mass., makes the following announcement to the trade regarding the practice of returning goods without notification where no fault exists on the part of the company: "The practice of returning goods without notification, where no fault exists on our part, has become a very serious evil and we have decided in future not to accept material of any kind or description unless we have been notified of the return and our permission for such return given.

"Where the fault does not lie with us we shall make a charge for clerical labor and incidental expenses of 10 per cent., and such other expenses which we may have been put to in the way of freight or expressage. If, however, the fault is with us, we expect to stand the cost.

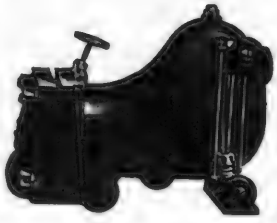
"We think the trade will agree with us that the charge as proposed is not a heavy one in view of the expense to which we are put in examining the goods and passing the credit through our books.

"We have prepared a form, copy of which is enclosed, which it will be necessary for customers to fill out before returning goods for credit.

"Hoping that the trade will recognize

McDaniel Improved Steam Trap

WILL DO THE WORK



When you need a Steam Trap buy one you know will work. With a McDANIEL we take all the chances. Don't pay until you are satisfied. We have been 25 years manufacturing Steam Traps and know there is no better trap made. May we send you one for trial?

Watson & McDaniel Co.

160 North 7th Street - PHILADELPHIA, PA.

Send for Catalogue

The Empire Low Pressure Steam Trap

Means Trap Satisfaction

The trap question will be settled if you install an EMPIRE. Adapted to all classes of low pressure work. Perfectly automatic in operation. THE SIMPLEST TRAP MADE. Let us send you one on trial. You will be surprised at its low cost too.

ASK FOR BULLETIN 101

AMERICAN DISTRICT STEAM COMPANY

LOCKPORT, N Y. CHICAGO, ILL.

the justice of our position, we remain, Yours very truly, WALWORTH MFG. CO."

De Laval Steam Turbine Co., Trenton, N. J., announces that the Dravo-Doyle Co., by whom it has heretofore been represented in Pittsburg, Philadelphia and Cleveland, will open an office in Chicago at Marquette Building in charge of H. S. Budd.

H. W. Johns-Manville Company, New York, announces the removal of its Houghton, Mich., offices now located at 85 Sheldon Street, to more commodious and convenient quarters at 96 Sheldon Street, where they will be better prepared to serve their patrons. As in the past, S. T. Harris, who has been associated with the company for a number of years, will be in charge of the offices at the new address.

Miscellaneous Notes

Vacuum cleaning installations have been the cause of trouble recently between the journeymen steam fitters and plumbers of Chicago. Strikes are reported on a number of jobs in which the vacuum cleaning apparatus was being installed by plumbers.

October building operations in 54 cities continue to show a falling off as compared with the figures for the corresponding period a year ago. In the east the decrease was 11%; middle west, an increase of 2½%; Pacific coast, an increase of ½%; and south, a decrease of 40%. Manhattan and the Bronx, New York, showed an increase over last year's figures of $765,230, but this was more than offset by the loss in Brooklyn of $1,879,515. Philadelphia showed a slight loss and Chicago reported a gain from $7,603,400 to $10,077,200.

Chicago Steam Heating and Ventilating Engineers has notified the trade that after January 1, 1911, the members of the association will no longer figure on buildings as sub-contractors. The association has sent the following notice to architects, builders, general contractors and manufacturers: "Owing to the very unsatisfactory results attending sub-contracting, it has been decided by the Chicago Steam Heating and Ventilating Engineers, who comprise nearly 100 members engaged in the installation of steam and hot-water heating apparatus, that after the first of January next not to take any work as sub-contractors, and to request that in taking figures for this class of work you let the heating contract direct.

"It has also been considered inadvisable for the heating contractor to estimate the pipe covering, as he is unable to get an intelligent figure for himself.

Positive Ventilation for Moderate Size Rooms

THERE need be no more unventilated rooms in homes and offices. The STURTEVANT Ready-to-Run Electric Ventilating Set meets all ventilating requirements for small and medium size rooms.

It consists of a small patented Multivane fan of wonderful efficiency, direct connected to an electric motor, and is arranged to be used independently or attached to a window board.

It positively ventilates by blowing in fresh air or carrying away foul air. It is light, portable, easy to install, and runs from electric light socket. Numerous Heating, Ventilating and Sanitary Engineers and Plumbers are installing these sets in residences, clubs, offices, factories, laboratories, telephone booths and all *moderate* size places requiring ventilation.

Special prices to Heating and Ventilating Engineers, Electrical Houses, Hardware Dealers, etc. Retail price: Size A, $35.00; B, $45.00; C, $55.00.

B. F. STURTEVANT CO., Hyde Park, Mass.

"We therefore trust that you will omit this from your specifications after the first of next year.

"It is believed that this action will be of benefit to the building industry, as well as to the members of the Chicago Steam Heating and Ventilating Engineers."

Cincinnati, O.—The Cincinnati Car Company is experimenting with a new system of car heating which will be continued for some weeks, and particularly through a cold snap, before its real merits can be determined.

The new system is a forced hot-blast draft. The air is sucked into the heating chamber on the front platform from outside the car, and after being heated is distributed through the car by a small motor fan, the discharge ducts being located under the seats.

There are three of the new systems in service on the pay-as-you-enter cars.

American Service Co., Pittsburg, Pa., has been formed by the management of the Pittsburg Engineering Agency, of Pittsburg, to take over the inter-state and Pan-American territorial representation of the Associated Bureau Service, comprising the several bureaus of technical references, American trade catalogs, engineering and industrial research. Offices have been opened in the Bessemer Building where, in addition to the associated bureau service a technical reference library and proposal exhibit quarters will be maintained for the general convenience of the public. The first-named bureaus are maintained in the interest of the technical profession and industrial corporations gratis; the aim being to develop an effective central clearing house of technical intelligence and applied service that will directly appeal to the rapid executor desiring instant attention to details.

Walter Brinton, superintendent of the Manganese Steel Department of the Taylor Iron & Steel Company's Plant at High Bridge, N. J., since 1895, has resigned, and has accepted a position as consulting engineer for the Edgar Allen American Manganese Steel Company, who are manufacturing Manganese Steel at Chicago Heights, Ill., and at New Castle, Del. Mr. Brinton's headquarters will be at the New Castle Plant.

Indianapolis, Ind.—B. V. Hubbard, an electrical and engineering expert of Indianapolis, employed several months ago to report on the advisability of erecting a heat, water, light and power plant for the purpose of supplying the Statehouse, the Indiana University School of Medicine, and the Soldiers and Sailors' Monument, has filed his findings with the State

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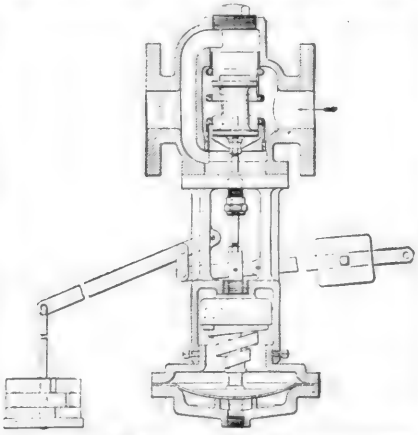
Also valves for vacuum heating systems.



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Waters Governor Co.
34 Oliver St., Boston, Mass.

Sanitary One-Piece Construction

Nothing to come apart

THE J-M Sanitor Closet Seat and Tank are moulded in one piece under hydraulic pressure. No sections to come apart; no bolts, braces, screws or nails to work loose.

J-M SANITOR

are the only seat and tank made in one piece. They will not crack, split or warp. Furnished in mahogany, oak and white enamel finishes.

Write nearest Branch for Sample of Sanitor Material and Booklet.

H.W. JOHNS-MANVILLE CO.

Manufacturers of Asbestos and Magnesia Products, Asbestos Roofings, Packings, Electrical Supplies, Etc.

Baltimore	Dallas	Milwaukee	Pittsburg
Boston	Detroit	Minneapolis	San Francisco
Buffalo	Kansas City	New York	Seattle
Chicago	London	New Orleans	St. Louis
Cleveland	Los Angeles	Philadelphia	1060

Board of Public Buildings and Grounds, showing that by the operation of such a state-owned plant the state would be able to save annually $10,900.

The report has been examined by the board and left with Governor Marshall, who will lay it before the legislative visiting committee and the general assembly, although probably without recommendation that the plan be adopted. The Governor and the other members of the board believe the plan to be feasible, but are not certain that with the present financial condition of the state it would be wise to construct and equip the plant, which would cost, the expert estimates, $105,346.

National Committee of the Confederated Supply Associations, at its annual meeting, held Nov. 17, at the Hotel Astor, New York, elected the following officers for the ensuing year: President, J. J. Ryan; vice-president, W. C. Myler; treasurer, L. O. Koven, secretary, Frank S. Hanley. Much progress was reported in the efforts of the association to promote the use of the Naco stamp by manufacturers.

Oelwein, Ia.—The Oelwein Light, Heat & Power Co.'s plant has been sold to R. W. Saunders and associates of Chicago.

Baltimore & Ohio Railroad, which has been engaged for some time in the elimination of many of its tunnels, reports that four of the six tunnels on the Cumberland division have been made into open cuts. The long Kingston tunnel is being equipped with a new ventilating system. During the construction of the new Kingwood tunnel which will be 4,250 ft. in length, with two tracks, the old tunnel has been equipped with ventilating apparatus and a similar system will be installed in the new tunnel when completed.

Manchester, Ia.—A controlling interest in the Manchester Heat and Power Co., of Manchester, has been acquired by L. Matthews, president of the State Savings Bank. It is announced that the electric lines and steam service will be extended and improved.

Salt Lake City, Utah.—Work on the two miles of underground conduits by which light and heat are to be furnished to the Hotel Utah building, the Deseret News building, the temple, tabernacle, assembly hall, bureau of information, Bishop's building, Vermont building, Templeton building and others from a central source progressed considerable during the week and will be rushed to a speedy completion.

The main tunnel to the temple grounds has already been completed and cemented. The work of laying the pipes will be started during the coming week. The principal work will be done in the temple grounds, where five laterals are to be built, extending to the various buildings in the inclosure.

Present calculations of the builders are to the effect that the new power plant and the entire tunneling system will be completed by the first of the year. The expense entailed is $250,000.

Streator, Ill.—The Schott Heating Co., Chicago, which recently purchased from D. Heenan the central heating steam system in Streator has begun the work of extending the piping to a number of new buildings which will be supplied with steam heat.

Norway, Mich.—It is announced that steam heat generated by electricity will be used to heat the Pennsylvania Railroad tunnel trains next winter.

A. W. Varney has resigned as heating engineer for the United States Radiator Corporation and has entered the firm of the Reading Heater & Supply Co., Reading, Pa.

Eveleth, Minn.—The Home Heating & Electric Company is laying new steam mains to the Othello Theater, Star office and Home Heating & Electric Company office, on Jones street, from Grant avenue. Many blocks on Grant avenue are being supplied with steam heat from the central plant on Jones street and many new business structures will be connected with the plant this winter.

Jenkins Automatic Air Valves

for the removal of air from steam radiators, heating coils, etc. Thousands in use and giving entire satisfaction. They are inexpensive, neat in design, and take up no more room than an ordinary air cock. Besides being very simple, they are most sensitive and durable.

JENKINS BROS., New York, Boston, Philadelphia, Chicago

San Francisco, Cal.—The local master steam and hot water fitters' association has established quarters in the Monadnock Building.

Institution (British) of Heating and Ventilating Engineers, at its autumn meeting, held in London October 18, unanimously elected Owen Row, of Manchester, as its next president. The annual meeting will be held at the Trocadero Restaurant, London, February 14, 1911.

United Bunch of Sheep of America held its annual meeting in Chicago, December 16, when delegates were present from New York, Boston, Milwaukee and Chicago. Plans are under way for the organization of additional branch folds in a number of other cities and it was announced that the Chicago Fold will shortly hold an open meeting at which the purposes of the organization will be discussed for the benefit of those not already enrolled.

New Incorporations

John Haddock Ventilator Co., New York. Capital, $100,000. Incorporators: John Haddock, J. A. McKay of New York; and R. R. Cowing, Jr., of Glen Ridge, N. J.

Beloit Lighting and Heating Co., Beloit, Wis., capital $30,000, to manufacture appliances for making gas from gasoline for lighting and heating purposes. Incorporators: H. W. Adams and Charles H. Jones and S. G. Strong. The inventor of the appliance is C. E. Sayer.

La Veta Light, Heat & Power Co., La Veta, Colo. Capital $20,000. Incorporators: F. B. Tiffany, M. B. Tiffany, and E. M. Fife.

Morgan Register Co., Anderson, Ind., capital $100,000, to manufacture devices for registering fares and for the ventilations of cars. Incorporators: H. A. Mansfield, F. A. Morgan and H. C. Stilwell.

Interstate Heater Co., Cleveland, O., capital $100,000. Among the principals is A. Bromberger.

Grafton Light, Heat & Power Co., Grafton, O., capital $200,000, to furnish heat, light and power and to build and operate electric railways. Incorporators: John T. McGraw, A. S. Warder, Jr., Charles R. Durbin, A. Hood Phillips and John T. McGraw, Jr., all of Grafton.

Sistersville Boiler Works, Sistersville, W. Va., capital $25,000. Incorporators: E. A. Ryan, P. Ryan, H. W. McCoy, S. G. Messer and A. C. Jackson, all of Sistersville.

Starck Plumbing & Investment Co., St. Louis, Mo., capital $10,000, to conduct a heating and plumbing business.

The Little Niagara Sanitary Air Washer

Is the Simplest and Best Air Washing Device on the Market.

It has no Spray Heads which clog up and require constant attention.

It saves nearly 50% of your Power. It is Sanitary as all the inside parts are removable and readily accessible for cleaning.

Manufactured by

Louis Narowetz

13-15 W. Kinzie Street Chicago, Ill.

President, J. E. Gunder; vice-president, M. S. Gunder; secretary-treasurer, Homer Gunder.

Case Patent Metal Boiler Cleaner Co., New York, capital $300,000, to manufacture compounds for cleaning boilers, etc. Incorporators: William McLaughlin, 100 No. 13th street, Philadelphia; Melbourne H. Haskin, 105 Chambers street, New York, and G. Krenkel.

William Corliss Valve Co., Jersey City, N. J., capital $50,000. Incorporators: Edward W. Corliss, New York; William Corliss and I. Clifford Ladd, Providence, R. I.

Guth Co., Baltimore, Md., incorporated to conduct a heating and plumbing business. Incorporators: Harry A. Warner, C. Chas. Friedel and Geo. A. French, all of Baltimore.

Klein-Marshall Furnace Co., Canton, O., capital $40,000, to deal in heating apparatus and ventilating fixtures and to do a general heating and ventilating contracting business. Incorporators: George D. Viers, C. F. Clewell and H. W. Pennock.

Peerless Pacific Co., capital $10,000. Incorporators: G. R. Smith, M. D. Helfrich and H. E. Weaver.

J. E. Gunder & Co., Ottumwa, Ia., capital $10,000, to conduct a general heating and plumbing business. President, J. E. Gunder; vice-president, M. S. Gunder; secretary-treasurer, Homer Gunder.

A. C. G. Lune Co., capital $25,000, to conduct a general heating business. President, A. Luke; treasurer, J. J. Leonard.

Contracts Awarded

T. M. Hennessey, Oswego, N. Y., heating, ventilating and plumbing Second Ward school for $2,880.

Noble Plumbing & Heating, Princeton, Ind., heating the machine shop for the Southern Railroad at Princeton. The shops were recently damaged by fire. The contract is one of the largest of its kind that has been let in Southern Indiana for some time.

J. M. Dougherty, La Salle, Ill., heating and plumbing the new Gay Theater in Ottawa for $4,500.

Wallace Bros. Co., Lafayette, Ind., vacuum heating system for the new Motsinger Device Co.'s factory at Lafayette; also heating the Carroll County Infirmary at Delphi.

Machinery & Electrical Co., Los Angeles, Cal., hot blast heating system for the Polytechnic High School at Long Beach, Cal., for $10,984; also separate contract for forty automatic heat regulators in the rooms to cost $3,000.

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James T. Corcoran, Brockton, Mass., extension of heating and ventilating system in new wing of the Brockton, Mass., high school, to cost $6,077.

John Perra, New Bedford, Mass., heating and ventilating the new Betsy B. Winslow school in that city for $7,400; the plumbing and vacuum cleaning system contract went to Jeremiah Coholan, New Bedford, at his bid of $4,848.

Baker, Smith & Co., Pittsburg, Pa., heating and ventilating high school buildings at Portsmouth, O., for $17,595.

Pacific Fire Extinguisher Co., San Francisco, Cal., heating ventilation sprinkler system, compressed air system and electric wiring for the new building for the University of California, in that city. The work, which is well under way, amounts to $10,400.

Fitzpatrick & Hoepfner, Columbus, O., heating and ventilating main building at the Ohio State University. The contract is one of the largest of the year in that section.

Thomas E. Gildea, Syracuse, N. Y., is completing the contracts for steam heating and ventilating apparatus for the City Hall and Croton School in Syracuse, N. Y.

W. H. Johnson & Son Co., Indianapolis, Ind., heating and ventilating the following school buildings: No. 43, Indianapolis, for $9,742; No. 26, Indianapolis, for $3,718; City School, Worthington, Ind., (including plumbing) for $3,440. Also heating plant for Chapman Steel Co., Indianapolis, amounting to $5,400, and heating plant for the new cathedral building of the Diocese of Indianapolis, amounting to $2,007.

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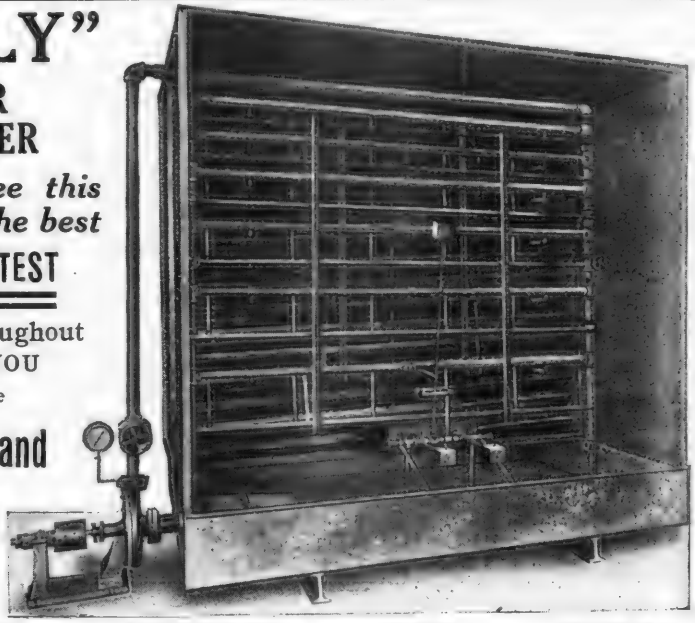

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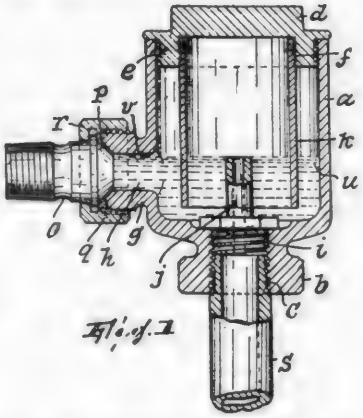

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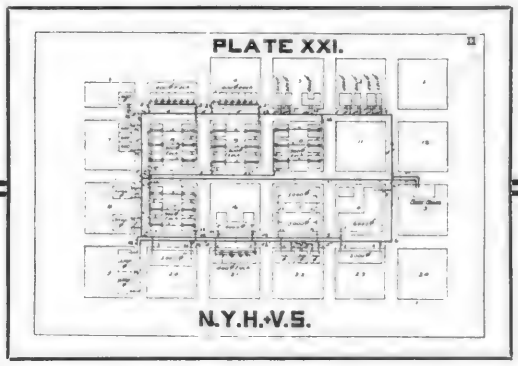

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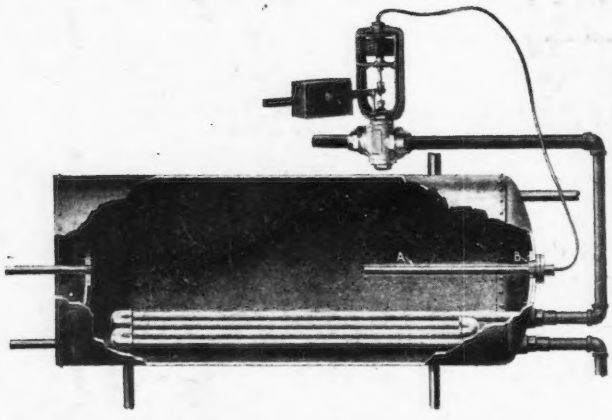

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